THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

COMPUTERWORLD

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TOP OF THE NEWS

Jobs for programmers and systems analysts are expected to boom. **Page 2.**

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IBM last week announced a Cobol restructuring program based on artificial intelligence techniques. **Page 10.**

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Europeans lag 1½ years behind U.S. vendors in developing MAP products. **Page 19.**

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Sperry moved to distance itself from the IRS' tax-return processing problems. **Page 2.**

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Representatives from IBM and independent DBMS vendors swapped barbs on relational techniques. **Page 22.**

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AT&T Unix versions of Samna Corp.'s Samna Word III and Samna+ were unveiled. **Page 83.**

Management Science America has been quietly trimming its work force, a company officer confirmed last week. Dennis Vohs, executive vice-president, said the software company has cut less than 5% of its 1,900 work force since September, mainly in administrative areas, but did not call it a layoff.

Vohs said the company in the past year has boosted employment in other areas. He also said some unannounced product plans "have been put off for a year or two." Damian Rinaldi, director of Framingham, Mass.-based International Data Corp.'s software and services program, said, "It may be a move to improve profitability in the fourth quarter, which has taken on added significance this year."

■

Data General's leap ahead of DEC (see story this page) may not last long. A DEC announcement has been scheduled for Dec. 4, at which time it is likely a new top-of-the-line model will be unveiled, possibly in conjunction with the expected Microvax III and a personal computer product.

See **NEWS** page 8

Ameritech buys ADR's software lead

By Clinton Wilder

Mainframe software developer Applied Data Research, Inc. last week confounded competitors and intrigued customers with an agreement to become a wholly owned subsidiary of Ameritech, a Chicago-based Bell regional holding company.

ADR customers contacted by *Computerworld* said they believe Ameritech, which posted revenue of $8.34 billion and profits of nearly $1 billion last year, recognized ADR as a technological leader (see story page 5). Most saw potential benefits from the alliance.

Ameritech, one of seven regional holding companies spun off from the former Bell system, will pay $215 million in cash to acquire ADR in a transaction that is expected to be approved by shareholders in

See **AMERITECH** page 4

Eclipse MV additions leapfrog DEC

By James Connolly

Customers and analysts echoed one term — leapfrogging — after Data General Corp. introduced high-end and low-end additions to its 32-bit Eclipse MV line last week.

The consensus among those observers was that DG's MV/20000 superminicomputers and MV/2000DC departmental system had outdone Digital Equipment Corp. products in pricing and performance, just as DEC had previously bettered DG with its VAX 8600 and Microvax II machines.

"In the game of DG and DEC leapfrogging each other, DG is now ahead. They've done a good job of packaging products that extend their product line," according to Gwen Peterson, an analyst with Dataquest, Inc., a San Jose, Calif., market re-

See **DG** page 6

Comdex spotlight shifts to issues

Networking, peripheral products top rollouts

By Eric Bender

LAS VEGAS — Reflecting the tough times for computer resellers, Comdex/Fall '85 seemed a bit subdued for a giant trade show held in a gambling city.

Although the annual gathering did produce a significant crop of new microcomputer products and sparked debate on the never-ending tangles among distribution channels, it featured few surprises. And even though final attendance figures were unavailable at press time, many attendees

See **NET** page 12

Software distributors fear losing corporate buyer

By Maura McEnaney

LAS VEGAS — Comdex/Fall '85 brought forth a myriad of software products. But for the resellers in attendance last week, the strident pitch of the software vendors was overshadowed by concern about the corporate market for software, now in the midst of some dramatic changes.

A Future Computing, Inc. survey of companies with more than 1,000 employees found that in 1984, 38% of the respon-

See **DISTRIBUTORS** page 14

CW EXCLUSIVE

Legal hang-up: State blocks school CATV bypass

By John Dix

ALBUQUERQUE, N.M. — The University of New Mexico learned that it can take more time and effort to deal with the legal issues of using CATV to bypass telephone company data services than it actually takes to upgrade a CATV network to carry data.

The school learned that lesson the hard way, but luckily under the moniker of research. The university was exploring medium-distance, high-bandwidth link alternatives.

The New Mexico experience was plagued by regulatory issues. But telecommunications analysts offered technical reasons for a bearish outlook on CATV as a way to sidestep regulated telephone company services. "CATV won't be a big factor in bypass or in any sort of data or business communications," according to Mark Winther, director of new communications services at Link Resources Corp., a market research firm in New York.

"CATV is a video business, and video transmission is very different from data," Winther said. Besides the fact that most CATV systems were designed to support only one-way communication, he said, the systems are "typically very leaky and unreliable relative to data communications needs."

For all of that, CATV systems do represent a potential bypass medium for hearty users. "It is happening in a few areas," Winther conceded. "Users who can't get what they need from the phone company sometimes look to the cable company in their areas."

The university was driven by research purposes, however, not by lack of telephone company services. The technology performed to expectations, but the bypass was short-circuited by the local telephone company.

In October 1983, the development

See **STATE** page 9

NEWSPAPER

Government predicts soaring demand for DP workers

By Mitch Betts

WASHINGTON, D.C. — The U.S. government's latest employment projections portray a dramatic and rapid growth in the number of jobs for computer programmers and systems analysts. The U.S. Bureau of Labor Statistics predicted a roughly 70% increase in these occupations by 1995.

The bureau's employment projections, released last week, illustrated the transformation of the U.S. economy from heavy industry to service-oriented businesses, but analysts with the bureau said the rate of growth in clerical jobs will slow down, in part because of office automation.

In an industry breakdown, the Bureau of Labor Statistics said that employment in the medical services, business services and computer industries will grow the fastest through 1995. Employment in the computer industry will grow at a predicted average annual rate of 3.7%.

For computer programmers, the bureau projected a 71.7% increase from 1984 to 1995, increasing the population of programmers from 341,000 to 586,000. Likewise, the Bureau of Labor Statistics projected a 68.7% increase in DP systems analysts, from 308,000 to 520,000.

According to a separate bureau study in March, computer programmers are paid an average salary of $20,318 at the trainee level and up to an average of $41,288 for senior team leaders or specialists. Average salaries for computer systems analysts range from $28,197 at the low level to $68,809 for senior managers, the report said.

Other fast-growing occupations in this decade will be DP equipment repairers, electrical and electronics engineers and technicians and computer and peripherals operators, according to the Bureau of Labor Statistics report "Employment Projections for 1995."

In fact, of the 10 fastest growing occupations, seven are in the computer and electronics fields. The others are paralegals, medical assistants and travel agents.

Comparing the occupations with those having the largest numerical job growth, computer programmers ranked 12th and systems analysts ranked 16th, well below the numerical growth for cashiers, nurses, janitors and truck drivers.

The Bureau of Labor Statistics bases its labor market projections on assumptions about the U.S. population and economy. The figures cited here and in the bureau's summary tables are based on a scenario of moderate economic growth, with the average annual gain in real gross national product at 2.9%.

Under all three economic scenarios — low, moderate and high growth — the Bureau of Labor Statistics expects that about nine out of 10 new jobs between 1984 and 1995 will be in service-oriented industries.

Fastest growing occupations 1984-1995

Occupation	Increase (%)
Paralegals	97.5
✓ **Computer programmers**	**71.7**
✓ **Computer systems analysts**	**68.7**
Medical assistants	62.0
✓ **DP equipment repairers**	**56.2**
✓ **Electrical and electronic engineers**	**52.8**
✓ **Electrical and electronic technicians**	**50.7**
✓ **Computer operators (except peripheral equipment)**	**46.1**
✓ **Peripheral DP equipment operators**	**45.0**
Travel agents	43.9

Source: U.S. Bureau of Labor Statistics

Computer programming is forecast to be the fastest growing DP occupation.

Sperry defends hardware

Claims software to blame for IRS fiasco

By Mitch Betts

WASHINGTON, D.C. — Sperry Corp. officials, commenting for the first time about major tax-return processing problems at the Internal Revenue Service, sought last week to disassociate the firm's computer hardware from the widely publicized calamity.

John F. Horton, president of Sperry's Federal Systems Group, strongly denied a report in the *Philadelphia Inquirer* that implicated Sperry in the IRS problems, and he blamed the processing delays on software.

The controversy concerns the $103 million systems modernization program at IRS service centers, which included the replacement of antiquated CPUs with Sperry 1184 multiprocessors and other hardware and the conversion of 1,500 programs from assembly to Cobol.

Problems with some of the new hardware and software caused the IRS to fall far behind in its processing of 1984 tax returns and refunds earlier this year [CW, April 15].

In a *Computerworld* interview at that time, Thomas Laycock, assistant IRS commissioner for computer services, placed blame on faulty tape drives, balky operating software, new Cobol applications programs that ran too slowly and were full of bugs and a lack of system testing.

The *Philadelphia Inquirer* last week said that a secret report by the U.S. House of Representatives Appropriations Committee investigators had concluded that the Sperry system "suffered massive breakdowns" and that the IRS should not have awarded Sperry the contract because its hardware failed several prepurchase tests.

Sperry's Horton said the news article was inaccurate and misleading. "To set the record straight," he said in a statement, "there is a major misunderstanding about the difference between hardware and applications software in a computer environment.

"Beyond any shadow of doubt, the hardware we supplied to the IRS performed within the requirements of the contract . . . [and] Sperry's computers have been operational better than 98% of the time during the entire tax processing season," he said.

"Problems with the overall IRS system did occur because of operations and the applications software developed by the [IRS] itself, and these problems had nothing to do with the integrity of our hardware," Horton said.

He stressed that Sperry computers did not experience any massive breakdown and were not associated with lost tax records or other reported problems.

The newspaper also reported that the agency's capacity enlargement program will replace the "ailing" Sperry computers in 1989, at an estimated cost of $185.5 million. Horton said that rather than replacing the Sperry computers, "it makes far more sense and would cost far less to complement the existing Sperry system so it can better handle any increased volume."

At a U.S. Senate subcommittee hearing last week, IRS Commissioner Roscoe L. Egger Jr. said the IRS has taken several technical and managerial steps to prevent a recurrence of processing problems in 1986, including steps to assure adequate processing capacity.

Egger said the number of CPUs will be increased by 40%, peripheral equipment will be added, and installation, testing and training will be completed before 1986 filing.

News needed now

Hard as we try to give our readers the most complete information available, some good news and feature stories never reach us.

Are you involved in an unusual application of DP technology in your company? Have you implemented successful cost-cutting strategies? Is something in your DP shop not working as designed? Know any unsung heroes? Heard any hot news about vendors? Are you aware of technology or management trends the trade press is overlooking?

If so, we'd like to hear from you. *Computerworld* has established a reader hot line for information regarding items of interest to the computing community. Call us toll free at (800) 343-6474. Ask for Peter Bartolik, news director.

We can't be everywhere — but our readers are.

CORRECTIONS

A co-originator of Burroughs Corp. Linc II information systems development tool [CW, Nov. 11] was misnamed. Gil Simpson should have been named along with Peter Hoskins.

The story "IBM offers CICS teleprocessing monitor for VM/CMS" [CW, Oct. 21] did not include pricing for the microcomputer portion of the CICS/CMS software. That portion has a one-time charge of $900 or a monthly charge of $50.

The operating system that Burroughs is having trouble with is called MCP Release 1 [CW, Nov. 11]. The disk storage program is called Qwik Disk.

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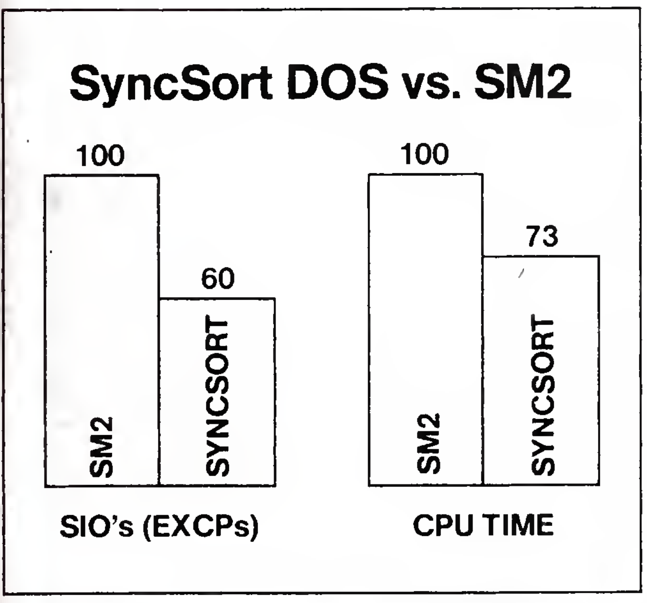

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Ameritech purchases ADR

From page 1

mid-December. The offer of $32 per share was $10 above the trading price of ADR stock the day prior to the announcement. It represents the largest amount paid for a software company and ranks only behind General Motors Corp.'s $2.5 billion acquisition of Electronic Data Systems Corp. within the broader software and services industry.

ADR among the elite

Celebrating its 25th anniversary last year with revenue of $128 million, ADR is among the elite of independent suppliers of IBM mainframe software, competing against Cullinet Software, Inc.; Management Science America, Inc.; Software AG; and others. Industry analysts had been expecting some consolidation among the independents due to the increasing competition from IBM's own software products, but most expected ADR to survive intact.

The announcement surprised even some ADR executives. "You may have found out before I did," one company executive said, adding that he did not learn of the deal until several hours after it was announced.

> *'For the first time, we feel pretty bullish about going up against IBM.'*
>
> **— John R. Bennett**
> **ADR chairman and CEO**

Some ADR competitors expressed a perhaps wishful sentiment that ADR stands to gain little from the relationship and has much to lose if it does not go smoothly (see story page 5). The harshest view was offered by Cullinet President John Cullinane, who said that Ameritech "will probably use ADR's technology for its own interests; that will make ADR's position of less significance than it is now."

ADR Chairman and Chief Executive Officer John R. Bennett told CW there will be no immediate changes in the company's top management or in product lines. But the deal provides ADR, which has posted a loss of $2.3 million in the first nine months of this year, with a cash-rich parent to fund the battle against the other independents and IBM.

"For the first time, we feel pretty bullish about going up against IBM," Bennett said. "We can continue our research and development investments in software without so much concern about quarter-to-quarter results."

Ameritech is the first Bell holding company to link up with a software house. The firm signaled its diversification intentions earlier this year by obtaining a Federal Communications Commission waiver from the restrictions on former Bell units to establish a software subsidiary.

In the independent software industry, ADR's Datacom/DB relational data base management system and Ideal fourth-generation language products have been very competitive and highly regarded. The company ranks second, behind Cullinet, among independent vendors of data base products.

"ADR seems to be a market leader in the products they have and the methodology they're espousing," said ADR customer Michael C. Nekechuk, data administrator with the Canadian Broadcasting Corp. in Ottawa. "I doubt if Ameritech would want to stifle it. I don't see any immediate problem."

May result in AT&T Unix versions

Another ADR user, Gary Mortenson, senior data administrator and systems planner with McGraw-Hill, Inc. in New York, speculated the deal "will probably result in Unix versions for ADR's product line."

ADR President Martin Goetz said there has been no discussion with Ameritech about a communications product line. "Telephone communications is a slow-growth area, and Ameritech, in its diversification program, had targeted systems software as a high-growth, high-technology area," he said.

William L. Weiss, chairman and chief executive officer of Ameritech, said ADR will operate on a decentralized basis, as other subsidiaries do. He cited the synergies of the two companies and said communications and information processing are rapidly converging.

Analysts had varying views of what impact the acquisition may have on either the mainframe software or telecommunications industries.

'Who's going to be next'

The announcement "is causing lots of speculation as to who's going to be next," noted Terence Quinn, an analyst with Dean Witter Reynolds, Inc. in New York. "I don't think there's going to be a next one. That was a unique situation with ADR. It was looking to be acquired."

Kenneth Burke, an analyst with Alex Brown & Sons, Inc. in Baltimore, unlike Ameritech's Weiss, saw little synergy between the two companies and said it was a diversification for the communications company. He said little short-term impact can be expected at ADR. But, he added, "What will happen is we'll end up with a few big players. I think there will be more acquisition activity over the next three or four years."

Telecommunications industry analyst Kenneth Leon, with L. F. Rothschild, Unterberg and Towbin in New York, said ADR's autonomy is assured for the near term because of Ameritech's regulated status. "If [the Second Computer Inquiry] is lifted, Ameritech will have a lot more flexibility in incorporating ADR into its own management," he said. "For now, [Ameritech management] will observe and learn."

Stephen Payne, president of PA Computers and Telecommunications, a consulting firm based in Princeton, N.J., said Ameritech's interest probably lies not in ADR's products but in its marketing presence. Ameritech has, he said, "bought a distribution facility for software that they have developed in-house."

Computerworld staff members Charles Babcock and Rosemary Hamilton contributed to this report.

AT A GLANCE

AMERITECH

Operating Companies: Illinois Bell Telephone Co., Indiana Bell Telephone Co., Michigan Bell Telephone Co., Ohio Bell Telephone Co., Wisconsin Bell Telephone Co.

Subsidiaries: Ameritech Mobile Communications, Inc. (cellular); Ameritech Communications, Inc. (CPE*); Ameritech Credit Corp.; Ameritech Development Corp. (venture capital).

Number of Employees: 77,700

1984 Revenue: $8.34 billion

1984 Earnings: $990.6 million ($10.17 per share)

* Customer premises equipment. Each regional holding company has its own CPE subsidiary.

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ADR deal: Rivals downplay importance, users look to future

The majority of the big players in the mainframe software business consider the announced acquisition of Applied Data Research, Inc. (ADR) by Ameritech of little consequence.

Top executives at companies competing with ADR told *Computerworld* that they expect the new partnership to have a minimal impact on their marketplace. Second, they dismissed the idea that last week's event will spark a trend of software mergers.

"My own feeling is the combination is a little bit regrettable," said Stuart Miller, president and chief executive of Software AG in Reston, Va. "If you ask me what Ameritech will bring to ADR or what's the benefit, I can't come up with an answer."

Other top software executives said the acquisition could eventually increase their market shares. "It may diminish ADR's presence in the marketplace," said John Cullinane, president of Cullinet Software, Inc. in Westwood, Mass., "which is just fine with us."

The executives doubted that a regional telephone company such as Ameritech has much to add to ADR, which is noted most for its relational data base management and fourth-generation language products. There is reason to believe, the executives said, that Ameritech will actually pull ADR away from its primary business as it pursues its own interests — communications.

"Ameritech doesn't bring products or technology to the partnership that could affect us," said Dennis Yablonsky, president and chief operating officer of Cincom Systems, Inc. in Cincinnati.

Not one of those questioned said he believes the ADR acquisition signals a software industry merger trend. Dennis Vohs, executive vice-president of Management Science America, Inc., said he had not seen enough similar activity to declare it a trend. He did note, however, that several companies are trying to get into the software industry and the best way to do it is through an acquisition such as this one.

Some of the executives interviewed made it clear that their respective companies are not going to follow in ADR's footsteps. Cullinane said his company voted in so-called shark-repellent provisions last year and prefers to "be in charge of our own destiny." Miller at Software AG said that, in a merger, "you lose the essence of an independent software company — the spark and the creativity."

One vendor, Computer Corporation of America, spoke of mergers in a more positive tone. It was acquired in 1984 by the Toronto-based financial services company Crownx, Inc. The issue of vendor stability is important to the user, according to John Donnelly, vice-president of marketing, and gaining a wealthy parent can make the user feel more secure. As far as creativity goes, "the entrepreneurial spirit is still here," Donnelly said.

The competitors do not believe Ameritech's deep pockets will make ADR a stronger threat. "Money thrown at a software company historically hasn't had much of an impact," Cullinane said. "If that were the case, IBM would be the only software vendor."

— Rosemary Hamilton

■

Users of Applied Data Research, Inc. (ADR) products expect little impact from the company's pending acquisition by Ameritech but do see potential benefits from the immense financial resources commanded by the regional holding company.

"From a user's point of view, this move gives ADR enhanced funding," according to Gary Mortenson, senior data administrator and systems planner with McGraw-Hill, Inc. in New York. "On the other side, the question is whether this will add bureaucracy to a company that in the past has been quite responsive. If it does, that would be a drawback." Mortenson uses ADR's Datacom/DB and Ideal products.

"It will give ADR more cash to work with," according to Israel E. Gotay, data base administrator for the U.S. Federal Energy Commission.

Other users of ADR products speculated about the telephone company's motivation behind the deal. Charles D. Moss, director of information systems with PPG Industries, Inc.'s Glass Group in Pittsburgh, said, "It will be interesting to see what Ameritech's strategy is behind this." Moss said he had been contacted by ADR but wants to have further discussions with company officials.

Patrick DiPronio, MIS director for Service Systems Corp., Clarence, N.Y., said he thought Ameritech's interest was likely based on the success of ADR's data base and fourth-generation language products. "ADR is gaining in the data base field, and it has an excellent product in Ideal."

An ADR user at one of the country's largest firms saw the deal as a life belt for the software company. Asking not to be identified, he said that the alliance "will eliminate any fears that ADR might go under due to slumping revenues in a bad year." He speculated that ADR might now move into communications products.

— Charles Babcock

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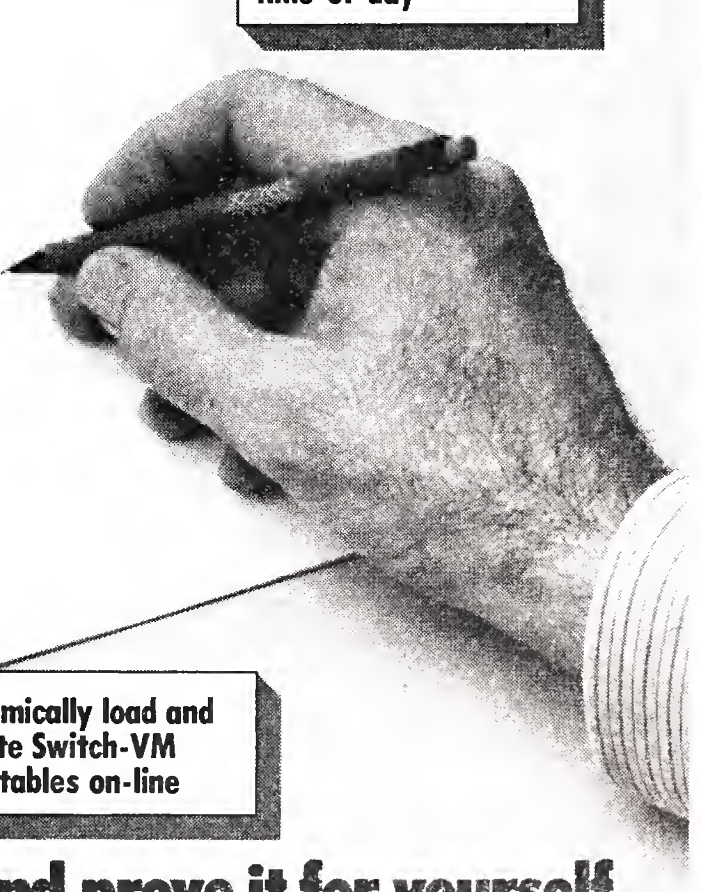

Co-operatively access other terminals' active screens

Swapping — move entire sessions to other terminals without disconnecting

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This fine-line mechanical pencil free with each checklist request.
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DG additions leapfrog DEC

From page 1

Data General Corp. 32-bit products

System Characteristics	MV/2000DC	MV/4000DC	MV/4000	MV/8000 Model 2	MV/10000	MV/20000 Model 1	MV/20000 Model 2
MIPS[1]	1	0.6	0.6	1.2	2.5	5.5	10
Memory Size in Bytes (Minimum-Maximum)	2M-5M	1M-2M	1M-8M	1M-8M	1M-16M	4M-16M	4M-64M
Purchase Price[2] (Memory Size)	$17,500 (2M)	$38,200 (2M)	$63,400 (1M)	$125,300 (1M)	$137,100 (4M)	$234,000 (4M)	$337,000 (4M)
Machine Cycle Time (Nsec)	160	200	200	220	140	85	85
Channels	2	2	2	2	3	3	3
Cache (Buffer) Size	None	None	None	16K	16K	20K	20K[3]
Bus Architecture	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Price per 1M Byte of Main Memory	$3,000	$4,250	$4,250	$4,250	$4,250	$6,000	$6,000

1. Million instructions per second.
2. For processor with disk and tape units, system software and console.
3. Cache per CPU.

CW Chart

The new systems will target areas where DG has been strong, such as office automation, design and industrial control.

search firm.

DG's announcement focused on three models in the Eclipse MV/20000 line, with performance claims of 5.5 million instructions per second (MIPS) for uniprocessors and 10 MIPS for dual processors. At the low end, DG released the 1-MIPS MV/2000DC.

DG officials claimed the MV/20000 outperforms DEC's VAX 8600 and IBM's 4381 for less money. They pitted the MV/2000DC against IBM's System/36 and DEC's Microvax II and the anticipated Microvax III.

The three models in the MV/20000 family include the MV/20000 Model 1, which is a uniprocessor with 4M to 16M bytes of main memory that provides 5.5-MIPS performance at prices starting at $234,000 for a 4M-byte system. The second model is the MV/20000C, a rack-mountable version of the MV/20000 Model 1 that is intended for sale to OEM customers and end-user organizations that do their own systems integration. A 4M-byte MV/20000C costs $200,000.

At the high end is the MV/20000 Model 2, DG's first tightly coupled dual processor. The 10-MIPS system costs $337,000 with 4M bytes of memory, which can be expanded to 64M bytes. Floating-point processors are optional on the Model 1 and Model 2 and standard on the MV/20000C.

At the low end of the MV line, DG added the MV/2000DC pedestal-type departmental computer. The MV/2000DC provides about 1 MIPS of performance, includes up to 5M bytes of memory and costs $17,500 for a 2M-byte version. Designed for operation by office workers, it runs the same AOS/VS system software as the rest of the MV family and includes a 38M-byte to 120M-byte hard disk.

DG also announced the following:

■ Technical Electronic Office (TEO), an integrated software package with the functions of DG's Comprehensive Electronic Office (CEO), but with graphics, windowing and artificial intelligence support through DG/Standard Applications and Graphics Environment for engineers and other technical users.

■ AOS/DVS, which was designed to let networked DG computers — including Eclipse MV systems and Series 7000 workstations — share resources in a manner transparent to users.

■ The DS7500 and DS7700 engineering workstations, which were designed to run AOS/DVS and TEO.

■ Price cuts of 18% for the previous high-end system, the MV/10000, and up to 20% for extra memory and disk storage for the Eclipse MV line.

■ DG/Data Dictionary, a data management software package designed to track resources and data throughout Eclipse MV systems and priced from $1,000 to $3,000.

■ Release 7 of AOS/VS, used by all MV systems but enhanced for the dual processor.

DG said the systems will be targeted to areas where DG has been strong, such as office automation, design and industrial control. The systems feature higher data availability, which DG said means quicker recovery from malfunctions and less intrusive data backup procedures. The DG announcement was well received by analysts and customers who placed first-day orders for the new systems.

Richard Mikita, an analyst with the Framingham, Mass., research firm International Data Corp., said, "Overall, it's really impressive. They came in with a better price than I had guessed. As a group the products are a really solid offering."

Ronald Paxton, manager of office automation consulting for Coopers & Lybrand of New York, noted, "What DG has going for them is a hierarchical approach, from personal computers to departmental computers to corporate computing. They have some pretty strong products and a common system architecture, and they provide a good migration path."

The MV/20000 products use Motorola, Inc. MCA2800 emitter-coupled logic and transistor-transistor logic gate arrays and four-stage pipelining for an 85-nsec cycle time. DG officials said the basic Model 1 includes only a CPU board and a system board. They said that a comparable VAX 8600 could require 11 boards. An upgrade from a Model 1 to a Model 2 involves adding a CPU board and a system board to the meter-high cabinet used in the Model 1.

Of the MV/2000DC, DG officials said it uses a single 15- by 15-in. board, where a Microvax II might need six boards.

DEC officials declined to comment on DG performance and configurability claims.

DG said that an MV/20000 handles a maximum of 1,008 lines and the MV/2000DC up to 24 lines. However, they said that with a typical mix of office applications, the Model 1 can provide optimum CEO support for 140 to 175 users; the Model 2, 210 to 260 users; and the MV/2000DC, 20 users. DG claimed that with a comparable mix an IBM 4381 Group 3 supports 175 users; a Wang Laboratories, Inc. VS 300, 135 to 140 users; and a VAX 8600, 155 to 160 users. DG also said the cost per user for the MV/20000 is $500 to $1,000 below those competitors.

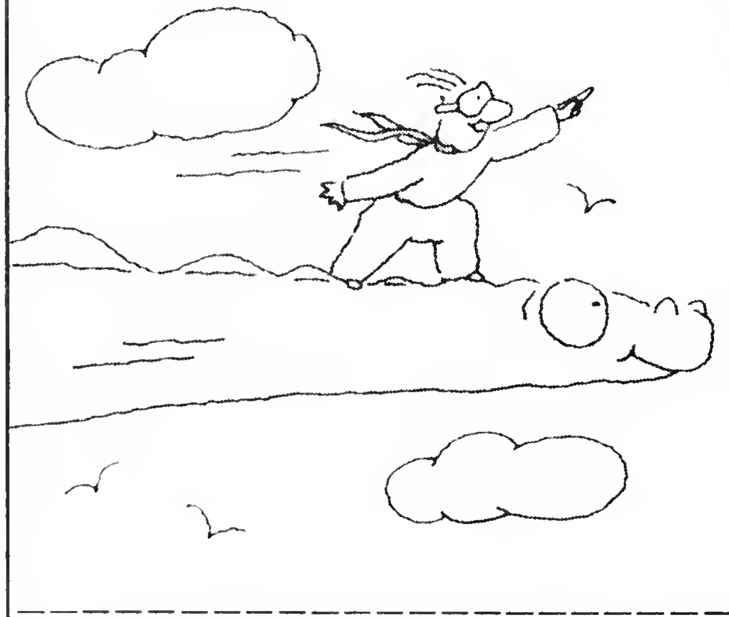
DG claimed price-per-user advantages of up to 25% for the MV/2000DC over the Wang VS 15 and VS 65, the Microvax II and the IBM System/36.

However, George Colony, president of Forrester Research, Inc. of Cambridge, Mass., said the advantages for DG over its competitors are closer to 10% for the MV/2000DC and 15% to 20% for the MV/20000.

Several observers questioned DG's claims of 10-MIPS performance on the MV/20000 Model 2. One prospective customer said the more realistic performance rating is 7 MIPS. Even if the 10-MIPS figure is accurate, some observers questioned the need for a 10-MIPS office machine.

But one area where that power could be useful is in integrating technical applications with office applications. Key elements in that integration of information systems and technical applications are TEO, which provides office automation tools for the DS/7500 and DS/7700 workstations, and AOS/DVS, which is available for those workstations and MV systems running engineering applications. The engineering workstations are available in single-user or multiuser, monochrome and color versions.

The DS/7500 monochrome version with 2M bytes of main memory and a 38M-byte disk costs $18,600. The DS/7700 monochrome version with 2M bytes of main memory and a 70M-byte disk costs $29,000.



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MCI settles antitrust suits against AT&T, six regionals

By Bryan Wilkins

WASHINGTON, D.C. — MCI Communications Corp. announced last week that it reached an out-of-court settlement in the antitrust suits it had filed against AT&T and six regional holding companies. The settlement ended a decade-long antitrust battle and was seen as an attempt by MCI to gain market share by working with its traditional adversaries.

Terms were not disclosed, but, sources said, the cash value to MCI approached $115 million.

MCI said the settlement terms also included stipulations that the country's second largest long-distance carrier (behind AT&T) will have full access to all network products and services of the six regional holding companies as well as to all products and services of AT&T.

The provisions of the out-of-court settlement, according to MCI, were similar to an earlier agreement it reached with the seventh regional holding company, U.S. West, earlier this year. These included a commitment by U.S. West to use MCI's long-distance services, timely hookups to local exchange facilities as they convert to equal access and access to planning decisions being made by the regional companies where network capacity is concerned.

MCI said it will report the value of the cash settlement as it is received.

The settlement involves two lawsuits. The first suit, filed in 1974, was tried for the second time earlier this year and resulted in a jury award of $113 million. The second suit was brought by MCI in 1979 and alleged that the independent telephone companies, AT&T and what were to become the seven regional holding companies conspired to monopolize the long-distance business by denying MCI connections at local exchanges.

Damages sought exceeded $1 billion

The second suit was in the process of pretrial discovery when the settlement was made. MCI Chairman and Chief Executive Officer William McGowan had estimated that the damages sought by MCI exceeded $1 billion. The suit's charges covered the period from 1975 though 1979, before the breakup of AT&T.

The lawsuit against the independent telephone companies and the United States Telephone Association is still pending.

MCI has made it plain that it is seeking to establish friendlier relationships with the seven regional holding companies, which are barred by the terms of the AT&T divestiture from the long-distance business. MCI's goal is to grab greater share of the long-distance market from AT&T Communications, the dominant provider of service with an estimated 85% to 95% of the market. MCI's market share is estimated to be between 5% and 7%, according to the firm.

Firm buys five MV/20000s

One of the largest first-day orders for the systems announced by Data General Corp. last week was placed by Beneficial Corp. The diversified consumer finance corporation ordered five MV/20000 Model 1s and 200 MV/2000DCs.

"We are using five 10000s now and will be replacing those with the 20000s," reported J. Edward Kerwan, president of Beneficial's data processing division. "We hope the better throughput will allow our system to operate faster and hope it will allow us to tie in CEO [DG's Comprehensive Electronic Office] to an information center concept, so we can get information in and out of our IBM environment."

Kerwan said that in addition to the five MV/20000s to be located in Peapack, N.J., where they will support the CEO package installed in April 1984, Beneficial will replace IBM dumb terminals in branch offices with MV/2000DCs. He said Beneficial eventually will install 1,000 MV/2000DCs in branch offices, where the machines will handle real-time processing through IBM Systems Network Architecture connections to IBM mainframes. While the MV/20000s will handle office automation duties in central locations, the MV/2000DCs will handle customer account transactions.

Another first-day customer, American Medical International of Beverly Hills, Calif., ordered an MV/20000 Model 2 for its own use and plans to purchase additional MV/20000s to package as turnkey systems for hospitals. "It's a good machine and figures to be very important to the health care community that we serve. We like the power, price and performance, the high availability features and the small footprint in relation to the overall performance and power," reported Dennis Peck, vice-president of sales for American Medical International.

Peck also said he was pleased with the delivery schedule for the DG machines — 90 days for the MV/20000 Model 1 and MV/2000DC and 120 days for the MV/20000 Model 2.

— James Connolly

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AS SEEN IN *DATA SOURCES.*

IBM, independents trade views on DBMS

Relational merits spark executive-level debate

By John Gallant

STAMFORD, Conn. — Long-simmering issues surrounding the technology of data base management systems came to a boil last week during a Gartner Group, Inc.-sponsored forum in which representatives from IBM and independent DBMS vendors traded opinions.

The verbal sparring began when panelist Edward Forman, senior vice-president of technology and advanced markets for Software AG, questioned IBM's commitment to relational DBMS technology.

The panel, chaired by Scott Smith, vice-president of Gartner Securities Corp., also included Joseph Farrelly, vice-president and director of research and development for Applied Data Research, Inc.; David Tory, senior vice-president of planning for Computer Associates International, Inc.; and David Litwack, vice-president of product development for Cullinet Software, Inc.

"IBM touted IMS as its primary DBMS for years," Forman said. "Then it flip-flopped into relational and began touting DB2. I wish there was someone on this panel from IBM who could clarify IBM's commitment to relational."

No sooner had Forman finished speaking when Robert Berland, director of strategic planning for IBM's Information Services organization, rose from his seat and strode to the podium — much to the delight of the audience in the ballroom of the Hotel Stamford Plaza.

Facing his competitors, Berland said, "The issue comes down to performance. We have to provide performance and data integrity for the largest companies in the U.S. There is nothing stopping relational technology from improving. But I challenge any of the relational systems to match the performance of IMS in the largest production applications.

"At this point," Berland continued, "relational cannot compete with the performance of IMS on a dyadic processor for a major company pushing state-of-the-art technology to the limit. Maybe relational will move there, but not for a long, long time."

In defense of DB2

Berland next seized the opportunity to respond to Gartner Group analysts who had earlier given DB2 a poor performance rating by saying that user experience with DB2 indicated it could process only about 5 or 6 transactions per second when large data bases were involved.

"DB2 can handle much higher volumes than anything I have heard here in the past two days," Berland said.

Cullinet's Litwack asked Berland why IBM had decided on a dual data base strategy rather than enhancing the older IMS with relational capabilities.

"Relational is not going to replace everything," Berland replied. "The ease-of-use issue disguises that fact. I am not certain that even when you push relational to the state of the art that its performance would match that of a networked system."

Smith, who had earlier faulted IBM for not providing a fourth-generation language and an integrated data dictionary, asked Berland about IBM's plans for such productivity tools.

"Believe me," Berland said, "we want them just as badly as you do. It is not that we don't know what we ought to do. You people have made that clear. The fact is that we do not have the programming resources needed to do a lot of these things. We have been trying to keep up with years of hardware advances, things like the 3090, dyadic processing, the extended architecture. The software people at IBM really have to scramble to keep up with hardware."

After the session ended, IBM's Berland spoke to a group of attendees who had gathered around him. "We have always focused on performance and data integrity. Believe me, productivity has been a major, constant concern. But every day I have to decide whether to kill my father or kill my mother."

TOP OF THE NEWS

NEWS from page 1

Growth in the mainframe software industry is expected to be only 23% for 1985 — a drastic decline from the 40% growth the industry enjoyed in 1984 — analysts said during the Gartner Group's Software Management Strategies conference last week. Independent vendors, though, will experience only 15% growth.

■

Management Science America said last week it has begun shipping its Expert Query system. Part of MSA's Information Expert applications integration environment, Expert Query supports ad hoc queries against application data bases. The query tool is available for MSA's general ledger, accounts payable and receivable, order processing, budget control and payroll/personnel systems at $10,000 per application. MSA unveiled Information Expert and the query facility in September 1984.

■

U.S. Sen. Robert Byrd (D-W. Va.) and the University of West Virginia are working to develop a "Software Valley" in West Virginia, focusing on Ada software development. They already have established a nonprofit venture called Software Valley Corp. to lure Ada software developers to the state and will announce more plans at a meeting today.

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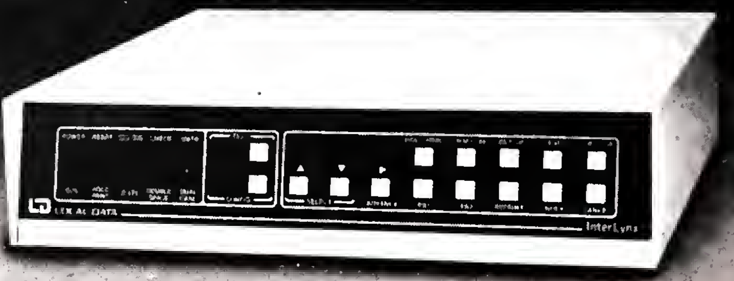

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State blocks CATV bypass

From page 1

group of the school's computing center began a joint research project with the Southwest engineering division of Digital Equipment Corp. The goal was to set up a medium-distance, high-bandwidth link between the computing center and the DEC plant in Albuquerque, according to Gary Boyles, associate director of the center.

Albuquerque Cable TV was accessible to both locations, and its broadband coaxial network offered the bandwidth required, making it a logical choice for the experiment, Boyles said. After a little talking, the cable company agreed to go along with the idea.

DEC assumed the cost of the broadband products needed to update the CATV plan for two-way data communications. This included a $2,000 channel translator from Bridge Communications, Inc.; 44 $300 reverse amplifiers; and two $1,400 Bridge broadband modems — for a total of $18,000.

Most CATV entertainment networks are not built with two-way communications in mind, although that has been a franchise requirement in some recent systems. To achieve two-way communications on the Albuquerque net, reverse amplifiers were installed on the cable every 2,200 feet, and the channel translator was installed at the cable company's headquarters.

A signal generated at the university is put onto the net with a broadband modem tuned to the frequency of the channel that the cable company put aside for data transmission. It travels upstream to the cable company's head end, where television programming is originated, and is turned around by the channel translator and routed downstream to DEC.

First successful transmission

The first successful transmission of data from DEC to the university was in February 1984. Installation of the equipment was relatively straightforward, but, Boyles said, tuning the amplifiers and head end to support the desired 56K bit/sec. link took the CATV company many uncounted man-hours.

"Once the cable plant and [broadband] modems were adjusted, the network worked well," Boyles noted. Although it was relatively expensive to ready the cable net for data communications, the project showed that CATV has a suitable signal environment for reliable data transmission, a primary project objective, Boyles said.

The link was used daily for file transfers and electronic mail until mid-1984, when an unforeseen obstacle cropped up. At the behest of Mountain Bell, the New Mexico State Corporation Commission investigated the university's use of the CATV system. The telephone company alleged, in essence, "that Albuquerque Cable TV was providing public utility telephone service . . . the same service Mountain Bell could provide," Boyles said.

The state ruled against the cable company and ordered it to cease and desist from offering or providing such services.

> ❞
>
> *Although it was relatively expensive to ready the cable network for data communications, the project showed that CATV has a suitable signal environment for data transmission.*

The issue of using CATV systems for bypass was brought to the Federal Communications Commission by Cox Cable Omaha, which lost a similar decision in 1983 when the Nebraska Public Service Commission ordered it to stop offering data services. The FCC ruled in favor of Cox Cable this past summer, saying that "state regulatory agencies cannot require regulation that would prohibit market entry," according to Anna-K Menzies, coeditor of "Telephone Bypass News," a monthly newsletter published by Telestrategies Publishing, Inc. in McLean, Va.

"It is a little unclear what the FCC meant by that," Menzies said. "The commission dealt with Cox only, so we don't know how the precedent will affect other cable companies."

For its part, Boyles said, the university will install and test a 1M bit/sec. multidrop link over CATV if the legal issues are resolved in its favor by the FCC and the state agency.

Although intended primarily for research, there may already be a practical application for the lessons learned in Albuquerque. "New Mexico has been planning a high-speed, statewide network along the Rio Grande corridor via a private nonprofit corporation called New Mexico Technet, Inc.," Boyles said. "The network is intended to provide a high-speed data communications facility to government, educational institutions and private industry."

The backbone of that network — which will run from Los Alamos, N.M., down to Las Cruces, N.M. — will be fiber optic. "Covering the last mile from the fiber-optic backbone to a user site at relatively high speeds and low cost is still a problem," Boyles said, "a problem that could have a solution via CATV data communications."

Gives you 223 illustrations for self-training and reference

At last,
the programmer's guide to TSO

If you're developing programs under OS/MVS and you're using IBM's Time-Sharing Option (TSO), then a book called *MVS TSO* is meant for you. It zeroes in on the tasks a programmer has to do most often, so you can master TSO in a hurry.

Here's what you'll learn, whether you're using native TSO or ISPF (a full-screen, menu-driven extension to TSO)

- how to create or change a data set or a library member
- how to allocate, display, print, rename, delete, move, or copy a data set
- how to compile, link-edit, and execute a program interactively
- how to debug a COBOL program interactively—that is, how to monitor the program's execution, look at the contents of data fields, watch the order in which subprograms execute, and so on
- how to start and control background processing for batch jobs (a background job doesn't run in your time-sharing region, so your terminal's not tied up as the job executes)
- why you have to use native TSO commands for some functions even if ISPF is available on your system

In short, you'll learn everything you need to know to use TSO commands or ISPF for program development.

For experienced TSO users: How to use command procedures

MVS TSO will also teach you how to use command procedures, or CLISTs. A CLIST is a series of TSO commands and statements that are executed in sequence (it's roughly equivalent to a JCL procedure). In this book, then, you'll find out:

- how to create and execute a simple CLIST for a specific job
- how to create and execute a generalized CLIST that can be used in a number of situations
- how to write a complex procedure that uses facilities much like those of a high-level language
- how to write a procedure for terminal I/O or file handling
- when and why you should write a program in a high-level language instead of using a CLIST

2 reasons why this book works

1. TSO is easier to master if you have plenty of practical examples to follow. That's why *MVS TSO* is loaded with illustrations. For example, you'll find:

- before-and-after screen images that show you what values to enter into a screen and what the result will be
- TSO command formats that clearly explain each operand
- sample CLISTs
- schematic drawings that show how TSO works and how it relates to MVS

These illustrations not only help you understand TSO in the first place. They also serve as handy references when you're working at your terminal.

What's more, they teach you the basic patterns of TSO commands and ISPF options. So you won't have any trouble looking up new features in the IBM manuals or other references when... and if...you need them.

2. This book is organized in a way we've found works well. After chapter 1 (an introduction to MVS and TSO), the book is divided into 3 parts: one each on ISPF, TSO commands, and CLIST. So if ISPF isn't available at your installation, you can skip that part and concentrate on native TSO. If you already have TSO experience, you can go directly to the part on CLIST.

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IBM unveils tool to restructure VM, MVS Cobol code

Language systems now easier to modify

By Charles Babcock and John Gallant

RYE BROOK, N.Y. — IBM last week introduced a VM- and MVS-based Cobol restructuring program, touted to be based on artificial intelligence techniques, that was met with interest — if not enthusiasm — by users and analysts.

The Cobol Structuring Facility (Cobol/SF) was designed to transform existing Cobol language systems into easier to understand structured programs to ease maintenance and modification.

IBM, which has been faulted by critics for failing to keep abreast of innovations in key areas of productivity software technology, is likely to have a powerful impact on the fledgling field of code restructuring.

User need spawns packages, services

The emergence of restructuring packages and services was spawned by an intense user need to reduce the growing software maintenance work load — a work load caused in large measure by the need to upgrade and patch older, poorly written applications constantly.

According to Nicholas Zvegintzov, publisher of "Software Maintenance News," IBM will be facing only a handful of competitors. They include Peat, Marwick, Mitchell & Co. with its Structured Retrofit service, Group Operations, Inc.'s Superstructure package and Language Technology, Inc. with its Recoder system.

"Half the code in the universe is Cobol, and all of it can stand to be restructured," Zvegintzov said. "It's a tool many people should have."

> *'Half the code in the universe is Cobol, and all of it can stand to be restructured.'*
>
> — **Nicholas Zvegintzov**
> **'Software Maintenance News'**

According to William Engel, president of Salem, Mass.-based Language Technology, "IBM's entry is a validation that will help establish Cobol restructuring as a valid productivity tool."

An IBM spokeswoman said Cobol/SF analyzes complex programs, structures them into a top-down hierarchy of components and identifies code segments that may reused for new program development. The system restructures programs automatically and generates reports that guide users in performing additional restructuring.

Structured programs produced by the facility are expressed in IBM's VS Cobol II. The spokeswoman said restructured programs are single-entry/single-exit programs that contain no functions like GOTO and ALTER, which are discouraged by structured programming proponents.

Useful for reducing maintenance

Cobol/SF's analysis mode allows a user to analyze an unstructured program for unreachable code or endless loops without actually restructuring the entire program. She said the product is useful for reducing software maintenance, facilitating program reengineering and for enforcing structured programming standards during new development projects.

The spokeswoman said the artificial intelligence techniques embodied in Cobol/SF are those used to organize an unstructured program into a hierarchy of components similar to those a software engineer would use. Cobol/SF is scheduled for shipment in January at a one-time charge of $125,000 or at a monthly license charge of $12,500.

Bernard Kaplan, vice-president of data processing for the New York investment counseling firm Scudder, Stevens & Clark, said the product would be useful to extend the life of older systems, particularly in an environment with high turnover and a lack of documentation. "But it would not be a cost-effective system for us," he said.

"We have been writing structured code for the past few years and have only one older system that is difficult to maintain," Kaplan continued. "We would not buy the product for one system."

'Large shops with gigantic programs'

That view was echoed by Robert Ofenloch, DP director for the Savings Bank Life Insurance Fund in New York. "I can see a need for it in large shops with gigantic programs and a lot of turnover," Ofenloch said. "But we would not even look at it at that price. We run a small shop, and we just do not have the need for it."

Boris Beizer, a consultant and author on structured programming, said IBM and other market players are pandering to an overly anxious user community concerned about rising maintenance costs. "This is a very popular thing to do," he said. "People have high hopes for restructuring, although those hopes may be misplaced.

"People think they can zap their code through something like this and they will realize great maintenance benefits," Beizer said. "But these systems don't solve the fundamental problems of badly written code."

Beizer said the system may be useful as an analytical tool for users who are rewriting older applications. "If the code is very bad, the amount of automatic restructuring the system can do will not be great. If it does restructure the majority of the code, then the code was not that bad to begin with."

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Net, peripheral products roll out

From page 1

suggested that the show floor seemed less crowded than in previous years.

As a sign of changing times, Comdex/Fall's highest profile product had first grabbed the spotlight two years ago. Microsoft Corp. staged a self-styled bizarre event to herald the long-delayed shipment of its Windows operating environment in a $99 retail package. The presentation closed with Chairman William Gates leading a chorus of *To Dream the Impossible Dream* and driving a golf cart overloaded with Windows packages through the jam-packed crowd.

A note of caution was sounded, however, as it was elsewhere in the show. Windows was launched with a conspicuously short list of enthusiastic endorsements from application vendors.

"You want to be able to work in that environment, but rewriting the software to take advantage of it is another matter," commented Fred Gibbons, president of Software Publishing Corp. If IBM came out with a graphics interface standard, "we'd follow it in a minute," he added.

"All we want is a graphics environment that works and is endorsed by IBM," said Camilo Wilson, founder of Lifetree Software, Inc. of Monterey, Calif. "So we play with GEM and Windows and wait for IBM." GEM is Digital Research, Inc.'s Graphics Environment Manager.

Many vendors did choose Comdex/Fall to jump on another bandwagon — personal computer local-area networks. Among new multiuser applications for IBM PC-DOS 3.1 networks were Ashton-Tate's Dbase III Plus [CW, Nov. 18] and a Smart Networking version from Innovative Software, Inc. of Lenexa, Kan.

The Innovative offering will provide data base management, spreadsheet and word processing functions.

> ”
>
> *The Microsoft Corp. presentation closed with Chairman William Gates leading a chorus of* To Dream the Impossible Dream.

"You can share data between various applications among a number of people on a net," Innovative Marketing Vice-President Ron Ferguson said. Available in first quarter 1986, the package will cost $1,795 for a three-workstation net with additional access software priced at $595 per user.

In another communications-oriented debut, leading personal computer modem supplier Hayes Microcomputer Products, Inc. unveiled a 2,400 bit/sec. internal modem for the IBM Personal Computer line and compatible systems. The Smartmodemb, which supports both asynchronous and synchronous data transmission through a single standard communications port, will cost $739.

On the hardware side, more machines compatible with the IBM Personal Computer AT made an appearance. They were led by Tandy Corp.'s Model 3000, the aggressive pricing of which drew considerable interest.

A basic system with 512K bytes of memory and a 1.2M-byte floppy disk drive will be available for $2,599, and a model with a 20M-byte internal hard disk drive will sell for $3,599.

Printer vendors out in force

As always, printer manufacturers were out in force at Comdex/Fall. This year's show saw a tremendous surge of nonimpact printers, which are expected both to displace medium-speed impact printers and to aid the fast-emerging application of desktop publishing. Among these, QMS, Inc. of Mobile, Ala., dropped through the $2,000 price barrier for laser printers, with a model carrying a $1,995 price tag.

Comdex/Fall demonstrated many advances in magnetic disk drives, one example being Eastman Kodak Co.'s 6.6M-byte minifloppy drives.

A host of optical storage devices also debuted, including a Compact Disc Read-Only Memory reader from Tecmar, Inc. of Solon, Ohio. Tecmar's new compact disc Massfile device, which works with the IBM Personal Computer and Digital Equipment Corp. Rainbow, costs $1,695 plus $295 for the controller card.

Tandy 3000 said to rival IBM's AT

By James A. Martin

LAS VEGAS — Tandy Corp., located in Fort Worth, Texas, last week introduced the Tandy 3000 personal computer, said to be fully compatible with the IBM Personal Computer AT but to offer more expansion capability and a smaller footprint at a reduced cost.

The 3000 was first shown at Tandy's annual shareholder meeting two weeks ago and was formally introduced at last week's Comdex/Fall '85 show. The machine is based on the 16-bit Intel Corp. 80286 microprocessor chip, operates at 8 MHz and is said to be 33.3% faster than the AT.

A company spokesman said the 3000 will be marketed toward Tandy's major corporate accounts as well as small businesses and work-at-home executives who require IBM capability at a lower cost.

The 3000 is available in two configurations, both of which include 512K bytes of random-access memory (RAM), expandable to 640K bytes on the main board, and which support up to 12M bytes. The standard configuration includes one 1.2M-byte

See **TANDY** page 13

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Standards, multiuser software crucial to micro net market

By John Dix

LAS VEGAS — Networks of personal computers may soon rival the utility of minicomputers thanks in large part to standards set by IBM, net vendors at Comdex/Fall '85 claimed last week.

Two things, however, stand in the way: lack of network acceptance and lack of multiuser software. Both are changing.

IBM's recently introduced Token-Ring network will help educate and focus the market for micro nets, according to William A. Lanfri, director of marketing for Corvus Systems, Inc., a net vendor in San Jose, Calif.

The Token-Ring "is a real boon because it adds a standard to the market," agreed Charles J. Hart, president and chief executive officer of Palo Alto, Calif.-based Nestar Systems, Inc.

Netbios' crucial role for networks

But perhaps more crucial to user acceptance is multiuser applications, the dearth of which has hindered network acceptance, Lanfri said. That shortage is expected to abate as the publication of IBM's Netbios bears fruit, according to vendors interviewed.

Netbios, published in the tradition of the IBM Personal Computer's open architecture, facilitates the job of software houses trying to develop multiuser applications for IBM networks. Applications written to this common set of network calls can be run on networks supporting Netbios, including nets from other vendors.

Companies like Corvus and Nestar are committed to supporting the applications interface in order to cash in on the software development work now in progress.

"Netbios itself is not that important, but getting the world to coalesce around a software interface standard is," Lanfri explained.

The ultimate goal of micro networks is to provide a "minicomputer on a string," Lanfri said. User education and commonly available multiuser software will help make that a reality. The weak link, however, is network operating system software that dictates how network resources are managed and shared.

IBM has not had the influence on network operating system software that it has had in other areas. While most companies support IBM PC-DOS 3.1, IBM's networking version of its PC-DOS operating system, few have adopted IBM's PC Network program, its network operating software.

Furthermore, there seems to be little industry enthusiasm about MS-Net, Microsoft Corp.'s network software, although some vendors are adopting portions of it.

Novell, Inc. of Orem, Utah, is perhaps the best known provider of network operating systems. The company has ported its Netware product to 25 different networks and jointly markets the software with other net manufacturers. Netware was the first operating system software to offer file serving, according to Jared Blaser, manager of marketing technical services. File serving, unlike disk serving, enables users to access mutual files while providing control to ensure data concurrency.

Corvus puts a lot of stock in operating system software, enough to purchase a company that specializes in the field. In May it bought Applied Intelligence, Inc., a network software development firm. Corvus' present Constellation net software, Lanfri said, is best for the sharing of disks and printers. Applied Intelligence will expand on this and enable the company to offer better file sharing capabilities.

Interestingly, interviewees downplayed the near-term significance of IBM's Advanced Program-to-Program Application (APPC) high-level program interface. APPC is part of IBM's System Network Architecture and provides for program-to-program interaction, particularly between micros and mainframes.

Lanfri speculated APPC will be typically implemented in network gateways, instead of in each micro. He also said APPC will not make a lot of sense for use with micros until they are truly multitasking.

Tandy 3000 said to rival IBM AT

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floppy disk drive for $2,599. The 3000 HD processor contains a 1.2M-byte floppy disk drive and a 20M-byte hard drive and costs $3,599.

The 3000, which is available now, features the Microsoft Corp. MS-DOS 3.1 operating system that supports Tandy's Vianet local-area network.

The Tandy 3000 Deluxe Graphics Adapter displays several modes, including 640- by 400-pixel two color and 640- by 200-pixel 16 color. The CM-1 color monitor costs $599 or $799 if purchased with the adapter before June 30. The VM-1 monochrome monitor is $199.95. Both monitors are optional.

The 3000 is said to measure 6½ by 19 by 18 in. and offers a standard real-time clock with CMOS RAM and battery backup and a standard serial/parallel adapter using a half slot.

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Distributors fear losing customers

From page 1

dents purchased software directly from the publisher, 38% purchased it from computer specialty stores and 5% were buying their software from computer mail-order firms. Another 16% said they were buying from wholesalers and distributors.

Last year, $4.1 billion of personal computer software was sold in the U.S., according to San Jose, Calif.-based Dataquest, Inc. Of that, 69% was business software.

But the corporate buyers appear to be shifting away from retail outlets. Corporate buying habits have contributed to a drop in software as a percentage of retail sales, now at 9.9% vs. about 12% a year ago, according to Egil Juliussen, president of Future Computing.

> *'Current software distribution channels are inadequate to handle innovative software titles, especially from the smaller publishers.'*
>
> **— Egil Juliussen**
> **Future Computing**

"We see corporate America demanding that software come directly from the software vendor," Kathleen Lane, director of software services at Dataquest, told Comdex/Fall attendees. "If you talk to the Microcomputer Managers Association, they don't want the retail store involved at all."

Price undercutting

Retail stores today are also challenged by price undercutting from the low overhead of mail-order houses.

Mail-order houses — companies that deal strictly in phone sales — have become leading sellers of volume software at slashed prices. Also emerging are the corporate resellers — typically former mail-order houses that now incorporate software support and service into their businesses.

"Retailers and dealers can't keep the volume to give competitive pricing," said Dan Spiner of Management Information Software Co. in New York during a recent interview. "Corporate customers today are getting 30% off list price in some cases."

"The state of software distribution is pretty lousy as a rule," said Mort Rosenthal, chairman of Corporate Software, Inc., a Canton, Mass., distributor.

High-volume, low priced software

MIS is capitalizing on the need for high-volume, low-priced software sales. Companies succeeding in that market include Rosenthal's Corporate Software, which expects $25 million in 1985 sales, and 800-Software of Berkeley, Calif., which expects $18 million in sales this year.

At the user level, corporations are still clamoring for site licensing agreements from vendors and demanding attention be paid to their specialized needs for purchasing and support.

These changes have helped create a bottleneck that is preventing customers from accessing new software titles, according to Juliussen.

"Current software distribution channels are inadequate to handle new and innovative software titles, especially from the smaller publishers," he said.

Although its origins stem from strictly mail-order business where volume takes priority, the corporate reseller is looking to discover new software titles.

Management Information Software employs a team of six evaluators who test new products and enhancements. Even with that team, bringing new products to market is often difficult, Spiner said. "There are some nice products that come out of the closet, but I can only afford to promote one or two products a month."

There are some, however, who maintain that the distribution bottleneck is only temporary and is not a result of the current channel structure.

"If a product has an inherent value, it will get to market, but it will take time," said Luther Nussbaum, vice-president of operations at Businessland, Inc. "There will be some software hits, but right now we have hit a lull," he said.

While Businessland continues to look for a few good products, Nussbaum said he believes the market will no longer accept the barrage of products it saw several years ago. "You don't get that kind of innovation in today's market," he said.

Chains such as Businessland will continue to sell software, but Future Computing's Juliussen said that there will be a resurgence of software-only stores.

Often failing in the past because of growth mismanagement and the imbalance between pricing strategy and product support, software stores in the future must maintain a large software selection, deal with the aftermarket customer base and produce small-ticket items, he said.

There may not be a clear solution to the software distribution bottleneck, but new technologies, including refined electronic distribution methods, could help loosen the flow, Juliussen said.

"Electronic distribution would be a major upheaval from current distribution markets," Juliussen noted.

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HP president advises vendors to return to business basics

Rapport with dealers, customers important

By Clinton Wilder

LAS VEGAS — Forging better relationships with dealers and resellers and making personal computers much easier to use will help bring microcomputer vendors out of the current industry slump, Hewlett-Packard Co. President and Chief Executive Officer John A. Young told attendees at Comdex/Fall '85 last week.

In his keynote address, Young called the microcomputer industry's challenge for future growth "a marathon, not a sprint" and further urged micro vendors to return to basic business fundamentals as they gird for long-term survival. He noted that 40% of U.S. capital spending is now for electronic equipment, making the computer industry more susceptible to lean economic times than ever before.

"The boom times of 1983 and 1984 fooled us all, and we lost our perspective on the marathon we're running," Young said.

"The easy personal computer sales have already been made. The electronics industry will grow as we meet customers' needs, not just sell equipment. And it does little good to make state-of-the-art products if, six months later, someone else can sell the same thing for half the price," he added.

Young emphasized that microcomputer vendors must improve their relationships with the value-added dealer/value-added reseller community, especially after sales are made.

"Perhaps we have devoted too much innovation to our products and not enough to our relationships," Young said. "Discounts, for example, should not be viewed as taking something away from the vendor because resellers are an integral part of the organization."

To overcome the user uncertainty that has partially caused the current microcomputer downturn, Young urged the development of true user-friendly systems that address real needs. He said that natural language interfaces and reliable networking technologies represent two of the greatest hopes for achieving that goal, particularly for sales to small organizations that comprise 95% of the businesses in the U.S.

In addition, Young stressed the importance of local-area networks, the most fertile ground for new product introductions at Comdex/Fall. Young maintained that only 4% of microcomputers currently operate within any kind of network, despite the fact that office workers spend an estimated two-thirds of their time communicating.

WORLD DIGEST

Computerworld News Service

TAIPEI, Taiwan — Two European electronics heavyweights, N.V. Phillips of the Netherlands and Siemens AG of West Germany, are scouting for Taiwanese electronics engineers in hopes of gaining the talent needed to compete against U.S. and Japanese semiconductor manufacturers better. Some 1,000 Taiwanese specialists reportedly answered a recent "help wanted" advertisement placed by the two firms.

LONDON — The skills shortage in the UK's computer industry is likely to worsen next year as DP managers try to expand recruitment, according to a survey by the National Computing Center. In 1986, the survey reported, the shortage of good staff, especially systems programmers, will continue; recruitment will become more difficult; and staff turnover rates will become worse.

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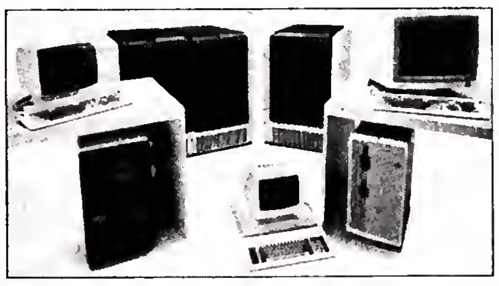

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VIEWPOINT

EDITORIAL

Security alert

Security is a nuisance. None of us like the thought: Somehow the fact that we must lock up our homes and cars makes us recognize our vulnerability to threats we cannot control. None of us like the bother: It requires planning, the purchase of the right devices, extra steps in our daily routine.

Twenty years ago, many DP professionals dismissed security as no more than a nuisance. Few do today. The threat to an organization's data and, therefore, to its health, became clear as computer systems moved out of physical enclosures and became friendly enough to be used by people throughout the organization.

What may not be clear is the character and strength of the threat as well as the importance of legislation to control it. No longer are hackers — genius programmers or teenage whizzes — the most troublesome factor in the computer security equation.

According to a survey of state prosecutors' offices by the National Center for Computer Crime Data, today's typical computer criminal is a petty thief who knows only enough about computers to recognize that they offer one more method for pilfering cash. Also, far more typical is the disgruntled employee who commits fraud or simply creates mayhem within an organization's computer system. Now add organized crime, which inevitably will dip into the enormous potential for computer fraud, and the seriousness of the threat is clear.

Given this growing gallery of computer criminals, what is being done to create legal protection for systems and their data? A majority of state legislatures have passed laws of varying effectiveness that cover intrastate computer crime. The Data Processing Management Association (DPMA) has been active here, first drafting model legislation, now planning to lobby for it.

But more critical by far is the interstate arena because so much of electronic technology simply ignores geographical boundaries. Here, only the U.S. Congress can act. As outlined in this issue's Special Report on security (see page 55), the U.S. House and the Senate are each debating two somewhat conflicting approaches. One, based on privacy law, views the breaching of a computer system as an invasion of privacy; the other, based on criminal law, views it as criminal trespass and burglary.

Unfortunately, these bills are competing for legislators' support, and that competition is hindering their progress. Computer crime usually contains elements of both criminal trespass and invasion of privacy; thus, the bills should be merged as quickly as possible so that debate can focus on creating the best legislation rather than on the best *approach* to legislation.

Unfortunately, too, the DPMA has not added its voice to this interstate debate, preferring to limit its lobbying to state legislatures. It has not participated in subcommittee hearings during 1985; it currently has no plans to testify in 1986. The DPMA, with its unique grasp of the issues, ought to be heard.

Computer crime is long past the stage of being a nuisance; it is a growing threat to the privacy and security both of organizations and of individuals. We should not allow either legislative bickering or the reluctance of professional groups like the DPMA to slow progress on a much-needed federal law.

LETTERS TO THE EDITOR

Today's fourth-generation debate reminiscent of 1960s' Cobol dispute

Although I found the article "Language Barrier: The fourth generation at work" [CW, Nov. 11] informative, I want to set the record straight on a quote attributed to me.

The article quoted me as saying, "A combination of principal fourth-generation language products can eliminate all Cobol in most shops today." I did not make this statement. What I did say is that a combination of principal fourth-generation language products can eliminate most Cobol in most shops today.

Fourth-generation languages can satisfactorily handle transaction-processing volumes of 5,000 per hour or less. Most of today's data processing shops do not handle loads exceeding 5,000 per hour.

The reference to the use of Applied Data Research, Inc.'s (ADR) Ideal at the New Jersey Department of Motor Vehicles provides a case in point. ADR had recommended that the department's application be coded principally in Ideal with the use of Cobol for performance-sensitive segments. Instead, Ideal was used 100%. The application is now being reimplemented based on ADR's recommendation and is expected to perform adequately.

There is nothing new in the debate over whether end users should migrate their applications to fourth-generation languages. The same debate raged in the early 1960s with the advent of Fortran and Cobol. At the time, some considered both languages to be too inefficient to serve as general-purpose development languages.

The advocates of this viewpoint were, of course, wrong. Yet, even as Cobol and Fortran became dominant, specific needs and demands for low-level assembler code remained.

Twenty years from now, people will look back on our debates over fourth-generation languages much as we now view the 1960s debates over Cobol. By the turn of the century, most applications will be built using fourth- and fifth-generation techniques. But even in the year 2000, some demand for low-level Cobol and Fortran encoding will still exist to solve performance-critical problems.

George Schusell
President
Digital Consulting Associates, Inc.
Andover, Mass.

Computerworld's cartoon

Amdahl's rebuttal

Amdahl Apache gets equal time in version of editorial cartoon

Quite frankly, many of us at Amdahl Corp. weren't too amused with the Amdahl Apache vs. IBM cartoon that appeared in *Computerworld* [CW, Oct. 28]. In rebuttal, we would like to submit our own version, which has been circulating companywide.

Take that, IBM . . .

Steve Chan
Amdahl
Sunnyvale, Calif.

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VIEWPOINT

A new definition of quality

By Wayne Smith

In a fall 1984 article in the *Sloan Management Review* titled, "What does 'Product Quality' Really Mean?" David A. Garvin of Harvard University attempted to synthesize a definition of product quality by drawing on a host of definitions from philosophy, economics, marketing and operations management.

From this multidisciplinary vantage point, he developed an eight-part framework that incorporated performance, features, reliability, conformance, durability, serviceability, aesthetics and perceived quality.

Although Garvin focused on product quality as it relates to the manufacturing of hard goods, his points, like so many engineering and manufacturing concepts, are also applicable to the problems facing information services management.

QUALITY

> ”
>
> *As professionals in information services, we live in a primarily quantitative culture.*

In Garvin's multidisciplinary model, quality as it relates to the application development process is not simply a set of engineering factors but rather a combination of factors, some of which are innate and absolute, some are transitory, some measurable and some totally subjective.

For example, the first two dimensions, performance and features, measure the degree to which a product or an application system meets its primary and secondary business requirements. This is the most common quality orientation in information services.

Similarly, the fourth dimension, conformance, measures the degree to which a product meets some predefined set of standards; for example, in a software development effort, this dimension might be represented by adherence to data base standards or communications protocols. These three dimensions are primarily product-oriented; that is, they are attributes inherent and measurable in the product itself.

The dimensions of reliability and durability are a blend of product and process-oriented quality issues. They measure the tendency of the product to fail or suffer excessive maintenance costs. Another process-oriented dimension is serviceability that measures the overall responsiveness of the information services organization to problems, corrections and changes.

Finally, the last two dimensions, aesthetics — the degree to which the product attributes match the preferences of the targeted and untargeted users — and perceived quality — the degree to which the product meets the expectations of the users — are highly subjective and vary continuously over time and among various individuals.

As professionals in information services, we live in a primarily quantitative culture. We strive for methods, techniques and processes of all kinds. We tend to see every problem as some kind of translation between the "problem space" and the "solution space." We quickly look for solutions in familiar architectures.

In other words, we subconsciously attempt to deal with only those dimensions of quality with which we are familiar, leaving the others to wander and vary unmanaged and, in some cases, to go unrecognized.

Ironically, because most information services managers are struggling with a poor-quality image as perceived by the rest of the organization, they tend to overlook those very quality dimensions — namely, aesthetics and perceived quality — which would yield the greatest leverage in this struggle.

From a strategic point of view, the message is clear: Information services management must recognize the eight dimensions of quality. Furthermore, managers must come to grips with the reality that although certain of these dimensions can be handled with traditional quantitative and engineering-oriented disciplines, there nevertheless exist some that are inherently subjective. And, moreover, these are equally important to the success of the overall quality program for an information services group.

Smith is vice-president, specializing in quality, at Applied Information Development, Inc. in Oak Brook, Ill.

Shortcomings of computer crime law

By Sanford Sherizen

Believing in computer crime law may be hazardous to your corporation's health. From my view as a criminologist, computer crime legislation isn't going to help corporations very much. Those who think that they will not have to actively prevent computer crime are going to be surprised.

READER'S PLATFORM

With more than two-thirds of the states and the federal government having computer crime laws, the rapid movement toward legislation is an impressive response to computer crime, particularly compared with how slowly the government responds to other pressing problems.

Yet, a rational criminal who determines risks and benefits is still going to choose computer crime. The odds continue to be on the criminal side because most computer crimes may never be detected. Few companies that detect these crimes are willing to press charges and, even in the unlikely chance that they are willing, prosecution may not occur. Who says crime doesn't pay?

Computer crime law, like most other law, is not the carefully crafted art form taught in civics classes. As yet, there doesn't even appear to be nationally accepted definitions of computers, computer crime or computer abuse.

The law continues to grapple with questions of the acceptability of computer-generated documents and other aspects of evidence. The problems caused by the lack of cooperation by the state government, federal government and private sector is exemplified by computer crimes that can easily cross several state lines, involving a number of private telecommunications systems and devices.

The lack of sufficient technical knowledge on the part of many prosecutors and judges can lead them to avoid computer crime law. Traditional fraud-type statutes continue to be used for computer crime even though cases may be lost because of inappropriate legal categories.

Although not toothless, the law has at least a bad-fitting pair of dentures. These problems will gradually lessen as computer crime laws are tested and refined. The legal system will become more attuned to the problem, and businesses may even be more willing to report cases. In the meanwhile, a good, reliable information security program is the best available means of controlling computer crime.

Sherizen is a Natick, Mass.-based information security expert who consults and leads seminars for corporations, banks and government.

Middle managers as barriers to change

By John P. Murray

A key factor in the eventual success of any attempt to develop a state-of-the-art information processing environment is the attitude of the department's middle management. Where those managers do not actively support necessary changes, the task becomes much more difficult. Where they withhold support and actively seek to forestall the process, they can render substantial harm to the effort.

One would think that middle managers would welcome any effort to move to a state-of-the-art position: The benefits not only to the organization but also to these individuals seem obvious.

DATA CENTER

Unfortunately, this is not always the case. Some will strongly resist these changes, primarily because of simple fear. Being comfortable with a given technology, particularly if that understanding creates a very solid position within the department for the individual, is one reason to fear and resist change.

The fear of not being able to learn new techniques and adopt new approaches, of not being able to keep pace with the coming changes can also be a factor. An important, yet perhaps not so obvious, fear is that as a result of change someone else will usurp power or authority now held by the particular manager.

An important aspect of the responsibility of these managers must be to support the goals of the department's senior managers. This support is required because these managers are closer to the rest of the people in the department, and their attitude toward the necessary changes will be a critical factor in the success or failure of the effort. Although strong senior-level management can carry the day in the end, the strain engendered as a result of the battle to do so can be considerable.

The senior manager must exercise care in distinguishing between valid objections and ploys to delay progress. Close questioning of the validity of the issues and challenging the various negative assumptions put forth by middle-level managers should be considered mandatory. The senior manager, as a part of this questioning process, should not only attempt to determine the appropriateness of these issues but also the real attitude of those doing the protesting.

In some situations it will become clear that a particularly recalcitrant manager is generating harm through continued resistance. If that manager has done a good job otherwise and is viewed as being able to make a strong contribution in the future, an effort should be mounted to bring about a change in attitude. If it becomes clear that there is little reason to expect change, it is in the best interest of all concerned to encourage that manager to seek new opportunities elsewhere.

The move to a state-of-the-art information processing environment requires considerable thought, planning and plain hard work. Given the magnitude of the effort, any and all unnecessary areas of obstruction must be, if not eliminated, at least controlled. The resistance of members of the middle management group is one of those areas. The senior manager of the installation should pay close attention to the probability of that resistance developing and, should it arise, move swiftly to put it down.

Murray is director of management and information services for American Breeders Service, a DeForest, Wis., division of W. R. Grace & Co., and is the author of Management Information Systems as a Corporate Resource.

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COMMUNICATIONS

DATA STREAM
John Dix
CW Senior Editor

AT&T tries different tack

AT&T Information Systems has assembled an impressive array of connection options for IBM 3270-type peripherals, some of which are embodied in the company's recently announced version of IBM's workhorse 3274 communications controller.

Manufacturers of 3270 plug-compatible equipment, such as Lee Data Corp., have offered alternatives to point-to-point coaxial cable links between terminals and controllers for some time. AT&T's 3270 devices do little more than those products, but AT&T adds value by incorporating support for its systems into its building wiring scheme and private branch exchanges (PBX).

The primary benefit of the AT&T 6500 Multifunction Communication Controller announced two weeks ago [CW, Nov. 18] is multiple-host support. The 3274-compatible box can be connected to three synchronous hosts or up to 16 asynchronous CPUs. Attached terminals, including models in the new AT&T 6500 line, can simultaneously access up to four different hosts through a windowing capability.

That in itself isn't unusual in the plug-compatible world. What is different is the range of ways that AT&T can connect 3270-type terminals to controllers. These include twisted-pair options, twisted pair with fiber-optic links, connections through AT&T PBXs and local network support.

AT&T's 6500 controller can support up to 32 terminals using unshielded twisted-pair wire instead of the usual coaxial cable. That wire may be part of an AT&T Premises Distribution System (PDS), although it doesn't have to be. PDS is a building wiring scheme similar

See **AT&T** page 22

Sytek rests on thin IBM ice

Feeling dependency on Big Blue for OEM contracts

By John Dix

Contracts to supply IBM with original equipment sing in the ears of small vendors like the Sirens to Odysseus. But young companies may be wise to heed the lesson of Homer's adventurer and brace against the temptation of, in this case, big and fast money. Big Blue can decimate vendors by withdrawing OEM contracts.

Sytek, Inc. is vulnerable. Half of the local network manufacturer's estimated $100 million revenue this year will come from a contract to supply IBM with the PC Network. The four-year contract, now in its second year, is in jeopardy, analysts said. IBM's recent introduction of the Token-Ring network has clouded the future of the baseband, coaxial-cable PC Network.

Dependency on IBM has put Sytek on tenterhooks. "Sure it has us worried," confessed Ken Biba, company cofounder and senior vice-president of marketing and planning. "But we've had plans in place since last year to change our revenue balance." Ideally, Biba would like to see 75% of the company's revenue come from end-user sales and the remainder from OEM business.

Biba said he hopes to achieve the revenue redistribution by increasing sales of Sytek's general-purpose local network and its version of the PC Network. If IBM pulled out of the contract, Sytek could suddenly find end-user sales providing all revenue — a situation that has frequently devastated microcomputer disk drive manufacturers. The most recent example of the latter phenomenon is Computer Memories, Inc., which soared to stardom on a lucrative IBM contract but now faces the loss of 75% of its revenue because IBM declined to renew the deal.

The fate of Sytek's IBM contract depends in large part on how IBM's introduction of the Token-Ring will effect PC Network sales.

See **SYTEK** page 22

MAP: Europe lags behind U.S.

By Edward Warner
Computerworld News Service

DETROIT (CWN) — European vendors are roughly a year and a half behind their U.S. counterparts in development of products that conform to General Motors Corp.'s Manufacturing Automation Protocol (MAP), vendors reported. Actual implementation of MAP in Europe is even further behind that of U.S. companies.

MAP is a network architecture intended for the integration of different types and makes of automated factory equipment, such as drill press controllers and minicomputer tracking systems.

Twenty-one companies participated in the MAP demonstration at the Autofact '85 Conference and Exposition on factory automation in Detroit. Only Siemens AG, the West German electronics giant, and ASEA AB, a Swedish robot maker, hailed from Europe, and neither had a commercial MAP-compatible product available.

Siemens engineer and executive Dittmar Janetzky said Siemens will not begin production of the very large-scale integration chips needed for its first commercial MAP product until next year. The ASEA robot used in the MAP display at Autofact, meanwhile, was run by a MAP-compatible controller from a U.S. vendor.

Europe's lag in the MAP arena is no handicap, according to Janetzky. MAP is needed in the U.S. because factories have automation equipment from a variety of vendors, but most European factories buy their automation gear from one source and have fewer data communications worries, Janetzky explained.

While European factory automation vendors may have few problems selling systems to European clients, many U.S. manufacturers seem poised to switch and to endorse MAP. GM, which sponsored MAP's development, has already an-

See **MAP** page 22

NEW THIS WEEK

- Insystec introduces a voice/data office automation system
- Codex introduces AT&T-compatible modems
- For more on these and other new products, see pp. 83-98.

INSTANT ANALYSIS

"The Open Systems Interconnect architecture in no way ensures that there will be heterogenous networks that can work together. Implementations of OSI will be very different."

— Dale Kutnick
noted industry
network consultant

Rolm ups voice/data lines, quadruples memory of switch

By Paul Korzeniowski

SANTA CLARA, Calif. — Rolm Corp. nearly doubled the capacity of its low-end switch recently, a strategic move given that the rate of new switch installations falls yearly and system upgrades promise needed revenue.

The total number of combined voice and data lines supported on Rolm's VSCBX — a private branch exchange (PBX) designed for small to medium-size businesses — has been increased from 144 to 272, capacity enough for 208 voice lines and 64 data lines. If a customer desires, the device can support 304 voice-only lines. The main memory of the switch has been quadrupled from 288K bytes of random-access memory (RAM) to 1,024K bytes of RAM.

With the added memory, users are able to install Rolm's Integrated Call Management feature that was introduced earlier this year. This feature supplies four cost management functions: toll restriction, least-cost routing, call queuing and equal-access connectivity.

Toll restriction prevents employees from placing long-distance calls to predetermined area codes, office codes or other call designators. Least-cost routing automatically chooses the cheapest route for outside calls. Call queuing assembles low-priority callers in queues to wait for the least costly trunks. Route optimization enables the switch to access carriers other than AT&T without requiring the caller to enter extra access digits.

The VSCBX's optional call-detail recording tracks calling activity and logs what trunk groups were used for inbound and outbound calls. Calls of extraordinary length or time are highlighted to identify abusers.

Rolm's enhancement strategy may be mirrored by other vendors, according to International Data Corp. (IDC), a Framingham, Mass.-based market research firm. IDC has predicted that the rate of new PBX installations will increase at a rate of only 2.75% throughout the rest of the decade. Reasons for the slow growth include failure of manufacturers to deliver promised technologies to market, the inability of suppliers to differentiate their products and former Bell operating companies' effective repositioning of Centrex services as an alternative to the PBX, IDC reported.

Because promise for new installations looks so gloomy, vendors will rely on revenue from customers who upgrade their current PBXs. The number of line shipments will grow at an overall rate of 5.83% through 1990. By 1990, nine out of every 10 lines shipped will be replacement lines rather than new lines, according to IDC. Rolm claimed that approximately 8,000 VSCBXs have been sold since it was introduced in 1979.

While Rolm holds third place in the market for low-end PBXs — Rolm has a 16% share behind Mitel Corp. with 24% and Northern Telecom, Inc. with 18%, according to IDC — upping the maximum lines supported on the VSCBX will help it retain customers and attract others.

Prices for the VSCBX range from $500 to $1,000 per line. The cost to upgrade an existing VSCBX ranges from $1,000 to $3,000.

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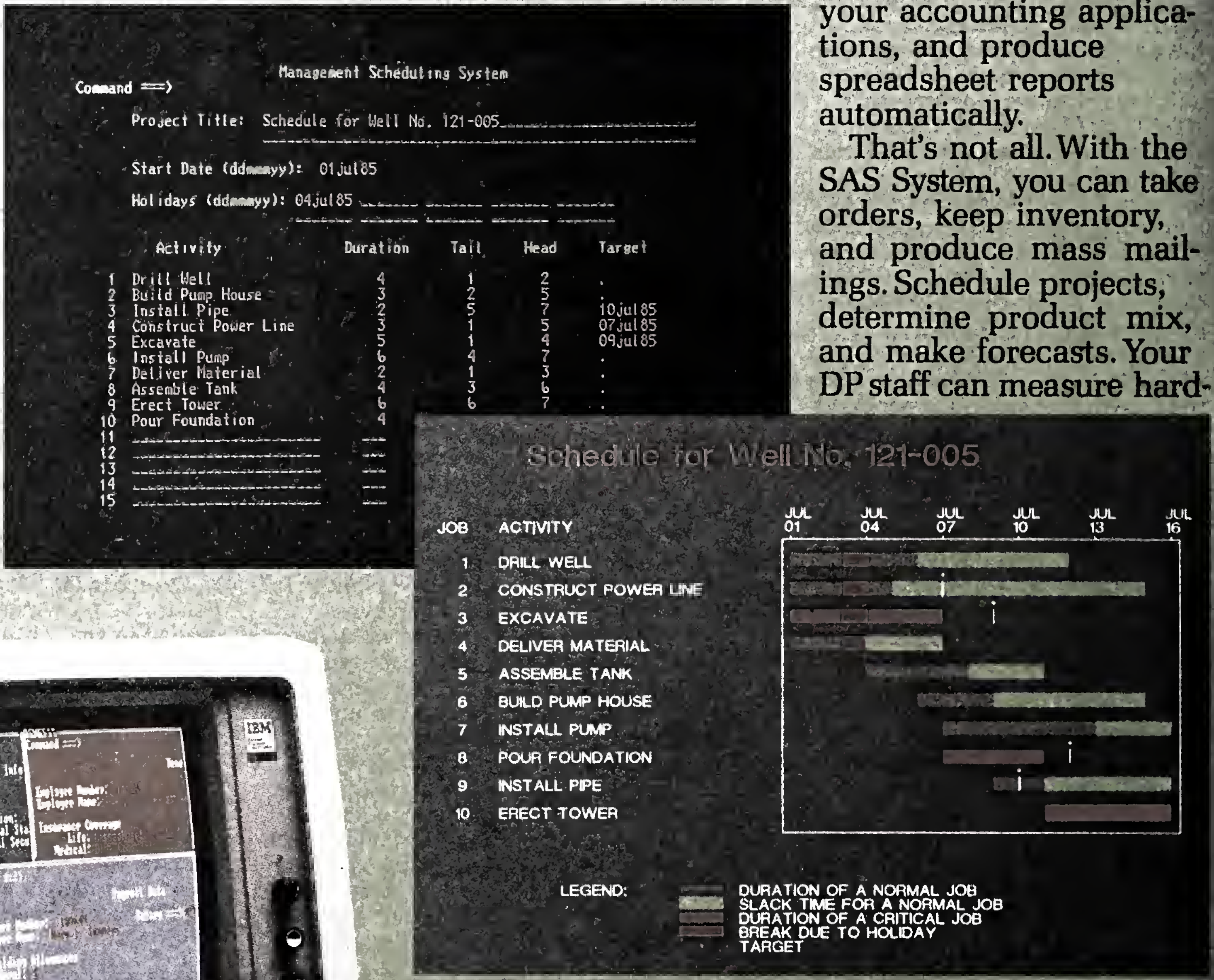

```
                        Management Scheduling System
Command ===>

      Project Title:  Schedule for Well No. 121-005_______________________
                      ____________________________________________________

      Start Date (ddmmmyy):  01jul85

      Holidays (ddmmmyy): 04jul85 _______ _______ _______ _______
                          _______ _______ _______ _______ _______

        Activity                 Duration    Tail    Head    Target

    1 Drill Well                     4         1       2       .
    2 Build Pump House               3         2       5       .
    3 Install Pipe                   2         5       7     10jul85
    4 Construct Power Line           3         1       5     07jul85
    5 Excavate                       5         1       4     09jul85
    6 Install Pump                   6         4       7       .
    7 Deliver Material               2         1       3       .
    8 Assemble Tank                  4         3       6       .
    9 Erect Tower                    6         6       7       .
   10 Pour Foundation                4
   11 ______________________        ___
   12 ______________________        ___
   13 ______________________        ___
   14 ______________________        ___
   15 ______________________        ___
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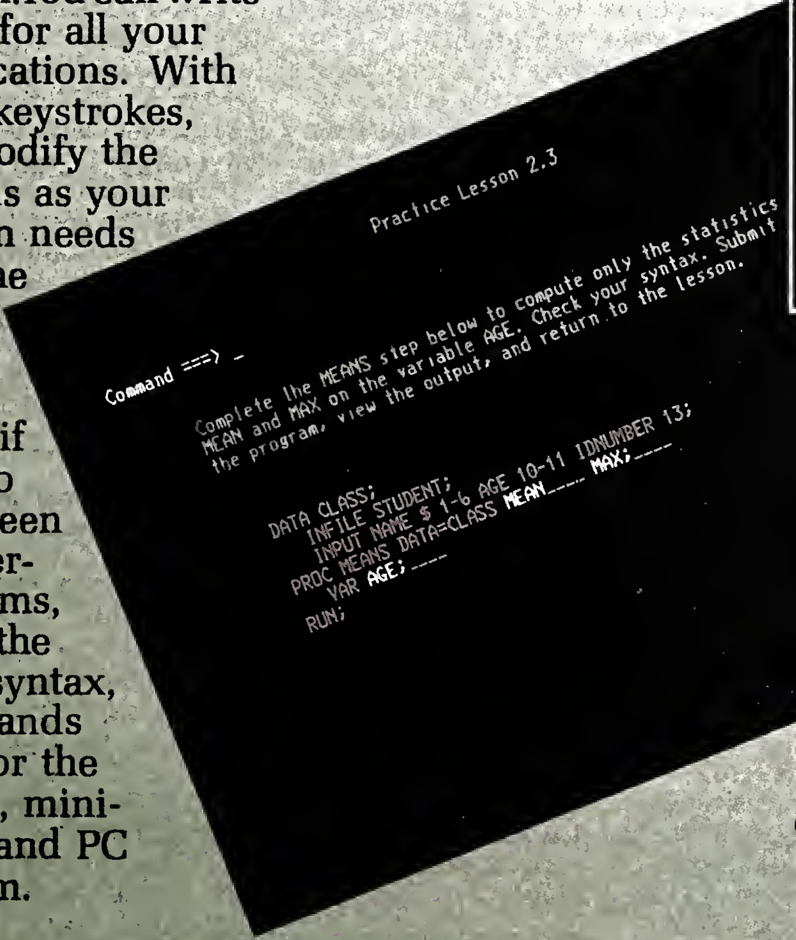

```
Practice Lesson 2.3

Command ===> _

Complete the MEANS step below to compute only the statistics
MEAN and MAX on the variable AGE. Check your syntax. Submit
the program, view the output, and return to the lesson.

DATA CLASS;
  INFILE STUDENT;
  INPUT NAME $ 1-6 AGE 10-11 IDNUMBER 13;
PROC MEANS DATA=CLASS MEAN____ MAX;____
  VAR AGE;____
RUN;
```

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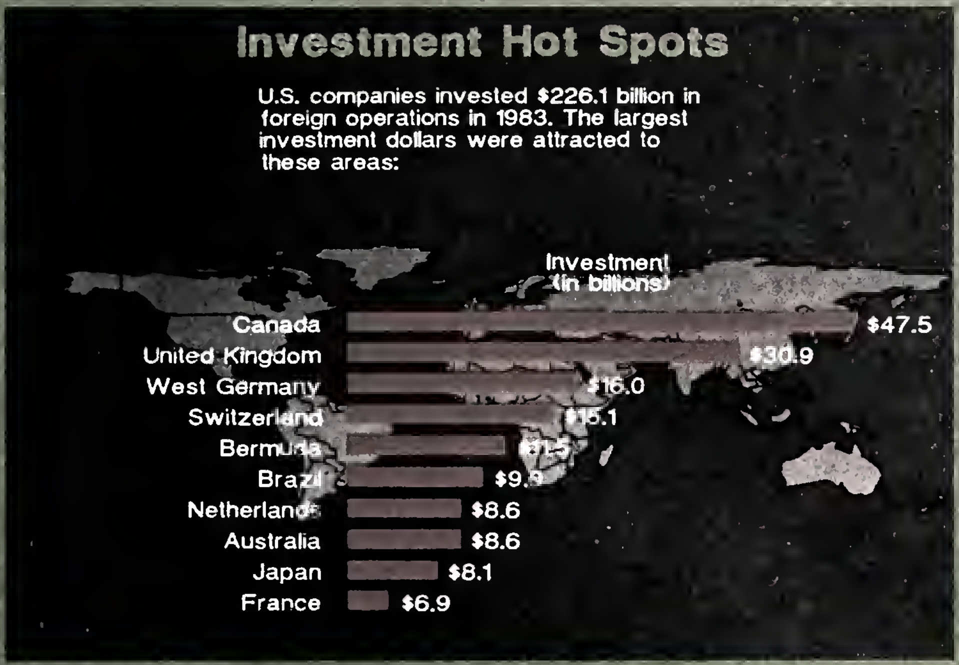

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Sytek rests on thin IBM ice

From page 19

To date, IBM has not been successful in selling the PC Network, according to Kim Myhre, director of communications research at International Data Corp. (IDC), a market research company in Framingham, Mass. He estimated that IBM has shipped 1,000 to 1,200 nets at most, representing roughly 10,000 Sytek interface cards. This is only 7% of the interface cards Biba said Sytek has shipped to IBM.

One factor possibly contributing to the low demand for the PC Network is that users have been waiting to evaluate the Token-Ring. If true, PC Network may be found adequate for many users' needs, and Sytek will be sitting in the catbird seat.

However, as with PC Network, the first release of the Token-Ring is intended for use with IBM Personal Computers. It is equally probable, then, that users faced with a micro network choice will take the Token-Ring because — unlike with the PC Network — IBM has committed itself to the Token-Ring's development.

A large unknown is how retailers will react. If they opt to stock the Token-Ring rather than the PC Network, sales of the Sytek product could plummet. "Retailers will stock what IBM tells them," predicted Eric Killorin, publisher of "PC Netline," a leading network industry newsletter.

IBM may push retailers to stock the net product that has the highest margins or encourage "retailers to stock both nets, possibly at the expense of other network companies," Killorin said. He said he believed that the Token-Ring net is a low-margin product at this point.

Many analysts said they see IBM pushing the Sytek product as a low-end network. In justification of that idea, IDC analyst Myhre noted that the PC Network does not conform to any Institute of Electrical and Electronics Engineers, Inc. (IEEE) standards, and IBM will not manufacture products for it. The Token-Ring, on the other hand, conforms to an IEEE standard and has IBM's full support.

The uncertainty surrounding the fate of the IBM PC Network can only further encourage Sytek to lessen its dependency on the industry giant. The company recently announced the System 6000, its own version of the IBM net. "The PC Network is the little brother of our product because IBM has artificially limited it to 72 nodes," Biba said. "We can build much larger [personal computer networks] over much wider areas."

The System 6000 complements the company's general-purpose broadband network that supports a broad array of computers and peripherals. "We think of ourselves as providers of general utility local-area networks, generally for large customers," Vice-President Biba said. "We think this is the single biggest growth segment of the marketplace."

"Sytek will continue to be a successful supplier to the general utility local network market segment," predicted Mark Stahlman, a security analyst with Sanford C. Bernstein and Co., an investment research firm in New York.

To strengthen the company further, Biba said, Sytek will diversify its product line by coming out with a token-ring network. It will also consider types of transmission media other than broadband coaxial cable.

Despite its reliance on IBM revenue today, two-thirds of Sytek's customers are repeat customers that are expanding their networks. This ensures Sytek a steady revenue stream isolated from IBM influence.

Asked whether IBM has approached Sytek about factory networks — which are broadband, like all Sytek products — Biba said the firm continues to have discussions with IBM about new products.

Regarding future relations with IBM, Killorin noted, "IBM is interested in just about all local network technologies and will be looking to companies that have a head start in that technology. That's why they aligned themselves with Sytek a year ago. But as Sytek outlives its usefulness, IBM will chew them up and spit them out. That is historically predictable."

MAP: Europe lags behind U.S.

From page 19

nounced its intention not to buy equipment that is incompatible with MAP. Other major manufacturers in the U.S. MAP users group are likely to follow suit soon.

The offering of MAP-compatible products by U.S. competitors has forced vendors like Siemens to pursue MAP compatibility to retain U.S. market share, Janetzky said.

Forces in Europe, meanwhile, are also pushing European vendors toward adoption of the MAP standard. This year, about 20 large European manufacturers formed a MAP users group. Vendors are able to join the group, but so far only four have done so, and only two are active, according to Janetzky, a member of the group's steering committee.

Another member of that group's steering committee said that, while European manufacturers are interested in MAP, European vendors are about a year and a half away from delivering MAP-compatible products.

If there is one reason for this lag, it may be the cost. According to U.S.-based Siemens-Allis Automation, Inc. President James Bardis, each vendor at GM's MAP display spent about $1 million in order to achieve MAP compatibility.

AT&T tries different tack

From page 19

to IBM's Cabling System that dictates how to wire a building to provide data outlets in each office.

Terminals can be located up to 400 ft away from a controller using wire installed for that purpose or twisted pair in PDS. Greater distances can be obtained by incorporating AT&T's Premises Lightwave System.

For example, multiple 3270 terminals could be connected to a wiring closet on one floor using twisted pair. Signals from these terminals could then be multiplexed over AT&T's lightwave system down to a controller in the processor room four floors away. Terminals can be located up to 2 km away from a controller using the fiber-optic link, which is greater than can be achieved with IBM's usual Type A coaxial cable or its Cabling System.

AT&T's PDS, like IBM's Cabling System, is configured much as wiring systems were for years to support standard telephone systems. In fact, PDS is essentially the same wiring scheme AT&T installs with its System 85 or System 75 PBXs. Customers can thus use the wire installed with their new AT&T PBXs as if it were a PDS as outlined above.

Customers can also use either PBX to support 3270s. AT&T sells 3270 Data Modules that enable terminals to be switched through a PBX to a controller. The modules come in three flavors. The 3270T is used to connect 3270s to a PBX and the 3270C is used to connect a PBX to a controller. Another terminal device, the 3270A, provides the same functions as the 3270T, but also enables the terminal to emulate a Digital Equipment Corp. VT100 and access asynchronous hosts.

Using a PBX to support 3270s also enables the terminal user to access multiple controllers or multiple hosts, with the PBX acting like a data switch. PBXs with DS-1 interfaces can use 1.54M bit/sec. digital T1 facilities to connect terminals to hosts across the country.

The Inter-Premises Trunk capability is also a feature available with AT&T's Information Systems Network (ISN), a local network. Last May, AT&T enhanced ISN to support IBM 3278, 3279, 3178 and 3179 displays, connecting the tubes to ISN nodes via twisted-pair wire. Terminal users can dial cluster controllers and maintain up two controller sessions.

In concert, AT&T's 3270 support provides more flexibility than IBM can offer, even though the mainframe maker now owns Rolm Corp., an AT&T PBX competitor. Interestingly, inroads AT&T made in 3270 support over twisted pair with its PDS are likely at the root of IBM's recent policy reversal regarding the Cabling System. Big Blue now says nonshielded twisted-pair wire is acceptable for 3270s in many applications.

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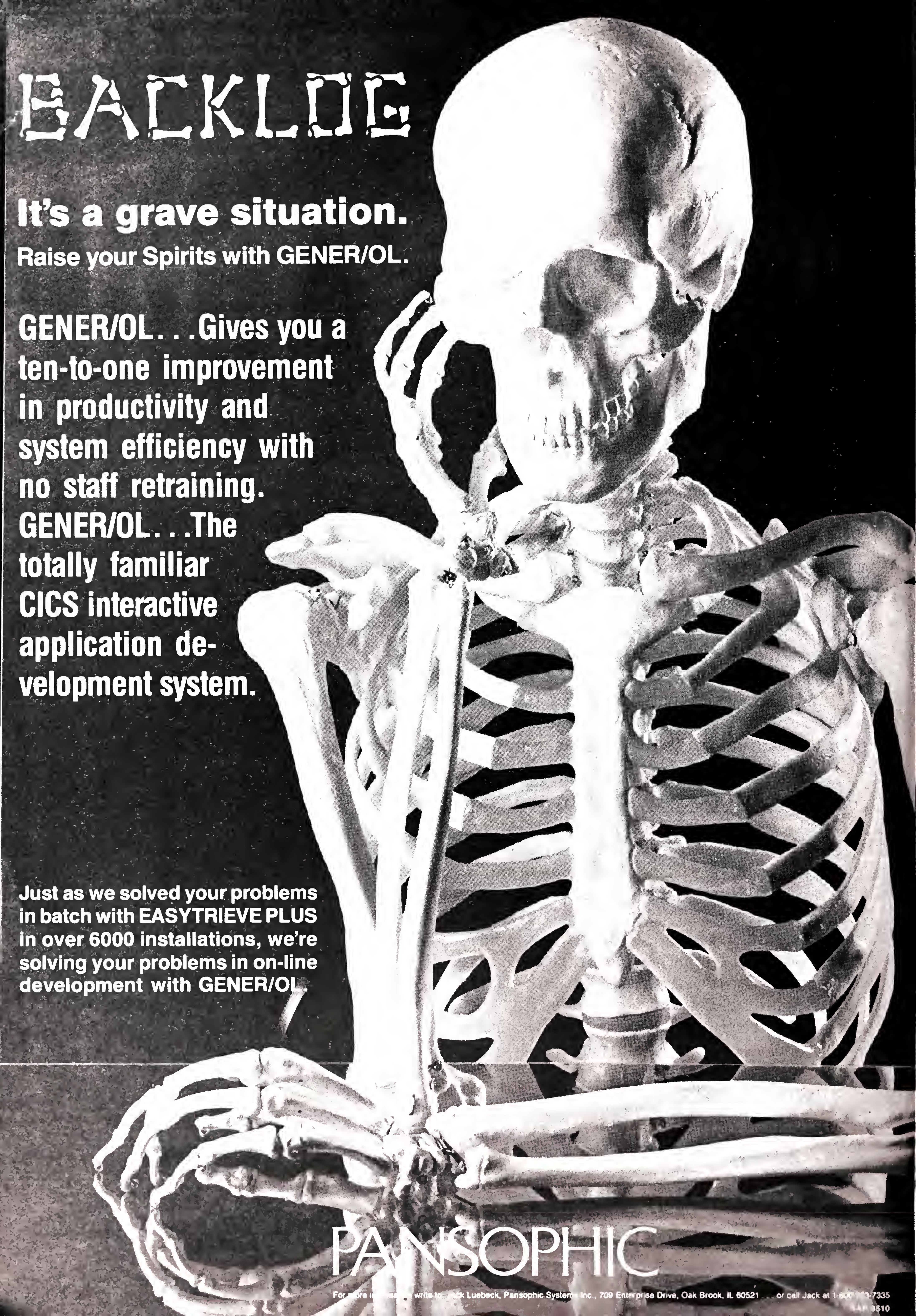

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SOFTWARE & SERVICES

SOFTALK
John Gallant
CW Senior Editor

IBM exploiting AT/370 ability

Last month, Thomas Foth lauded IBM for having introduced a version of its widely used CICS teleprocessing monitor for the VM/CMS environment.

Foth, a member of the senior technical staff at Adesse Corp., a Ridgefield, Conn.-based VM software house, said CICS/CMS, running under VM/PC on the IBM Personal Computer AT/370 and XT/370, held the potential to transform those machines into "dream workstations" for CICS applications development [CW, Oct. 21]. Foth tempered his enthusiasm by stating that IBM would have to improve the performance of the XT/370 and AT/370 to tap that potential.

Less than a month after Foth commented on the CICS/CMS unveiling, IBM significantly bolstered the power of one of those machines, the currently slow-selling AT/370. VM/PC Release 2, announced earlier this month [CW, Nov. 11], boosts AT/370 performance by as much as 50%, depending on the complexity of the application being processed. In addition, the enhanced operating system allows AT/370s to be linked through IBM's PC Network and includes several other modifications that, combined, serve to improve performance even further.

VM/PC now enables users to utilize add-on memory as a page cache. That means the most frequently used pages — portions of an application to be executed — can be stored in expanded memory rather than on the AT/370's disk. Foth said the reduced disk access required to run complex applications really improves performance.

"Any time the AT/370 had to do

See **IBM** page 29

Big Blue must push software

Analysts cite need to bolster its advanced technologies

By John Gallant

STAMFORD, Conn. — To get its hardware house back in order, IBM must become more aggressive in developing and marketing software.

That was the message that Gartner Group, Inc. analysts conveyed at the market research firm's Software Management Strategies conference last week. Gartner observers told visitors that IBM must, among other steps, bolster its relational technology and push the emerging LU6.2 communications and SQL relational data manipulation language standards to boost hardware sales and remain a driving force in the software industry.

"The mistake is in viewing IBM as a hardware company," said Scott Smith, vice-president of Gartner Securities Corp. and the financial analyst responsible for overseeing trends in the software and services industry. "Software drives hardware sales, and IBM, increasingly, is coming to realize that. Software development clearly drives hardware growth. So, IBM must get more aggressive. It cannot leave its future hardware sales to the independent software vendors."

IBM's increasingly aggressive software moves, said H. Michael Braude, vice-president and director of Gartner's Software Management Strategies Service, will likely be made in accordance with its perceived four-pronged software strategy. The first prong of that strategy is to provide software that fully exploits the capabilities of its hardware.

"IBM is not doing that," Braude said. "It has internal constraints, and it has had to set priorities."

As an example, Braude cited VM's lack of support for so-called four-way processing on IBM's largest systems, the 3090-class mainframes. Although IBM announced an Extended Architecture (XA) version of VM earlier this year, it will have to work to develop further features in that operating system.

See **BIG** page 26

IBM emulation systems bow

By Peggy Watt

SAN JOSE, Calif. — Micro-to-mainframe system vendor Forte Communications Co. last week released a string of new and upgraded products that improve upon the IBM communications family.

Among the releases is an upgrade of its 2-year-old file transfer program Fortenet, which operates at nearly twice its previous speed, and enhanced versions of Forte 3270 software, Fortegraph S3G and Forte/PJ.

"Our strategy now is to be in that LU6.2, DIA/DCA [Document Interface Architecture/Document Content Architecture] arena" embraced by IBM's micro-to-mainframe family, said George Moore, Forte marketing director. "We've seen a lot of changes in the marketplace," he said. "Buyers are looking for a single-vendor solution."

Forte's answer is to offer communications system products that do the same job as their IBM equivalents but provide more features.

The company will add Personal Services/PC support to its existing Forte/PJ and Fortegraph S3G software, enabling documents that do not meet the DIA/DCA standards still to have access to IBM's Distributed Office Support System.

"It's our intent to keep our customers consistent with the IBM world," Moore said.

Current customers will receive free upgrades, but the company expects more demand from new customers who will opt for the enhanced Forte product over the IBM coaxial product.

Fortegraph licenses are $2,590 including Forte/PJ or $1,595 alone and will be available in December, Moore said.

Forte's Fortenet II now includes pro-

See **EMULATION** page 27

INSIDE

Sequent Computer Systems and Verdix announce a parallel implementation of the Ada language for Sequent's Balance 8000 parallel processors/**27**

NEW THIS WEEK

- Samna ports Samna Word III and Samna+ to AT&T's Unix System V
- For more on these and other new products, see pp. 83-98.

INSTANT ANALYSIS

"I don't want to give the impression that we're going to rush out and spend all of their money, but I feel very comfortable that our customers will see positive results. . . . We're part of an $8 billion company, [and] that lends a lot of credibility."

— Applied Data Research Chairman and CEO John R. Bennett, commenting on the pending sale of his company

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Oracle announces portable version of IBM SQL/DS and DB2

Any application written for IBM's SQL/DS or DB2 relational database management systems will now run without modification on DEC, DG, AT&T, HP and several other manufacturers' minis, and a wide range of micros, including the IBM PC/XT and PC/AT.

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■ **Why not Cullinet, ADR or Focus?** There is a clearly defined standard for relational database systems. It's called SQL, and it's from IBM. Both ANSI and the US Government are in the process of adopting SQL as *the* standard database language. The Cullinet, ADR and FOCUS software packages each implement their own unique database language - each one painting the user into its own corner. Since its inception, Oracle Corporation has provided total IBM SQL compatibility.

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FOCUS, Cullinet and ADR offer either a limited subset, a completely different product or nothing at all (respectively) for the PC. And none have minicomputer products.

■ **Why not just go with DB2 or SQL/DS?** A relational DBMS simplifies but does not by itself eliminate application programming. Additional tools are necessary if users are to create and maintain their own applications.

DB2 and SQL/DS are relational systems, period. ORACLE is a relational DBMS plus integrated 4th generation software tools for application generation, report writing, color graphics and network communications.

Furthermore, SQL/DS and DB2 run only on IBM mainframes (and are somewhat unlikely ever to run on another vendor's system). ORACLE runs on more IBM hardware and operating systems than do IBM's relational products.

■ **What about Goldengate, dBase III, Symphony or Framework?** PCs need more than PC software if they are to be usefully integrated with corporate data processing. Incompatibility with SQL, while serious, is not the only major problem with these micro packages. None provides an acceptable level of data security, integrity or recovery facilities. And their PC-to-mainframe links are functionally primitive and difficult to use.

To effectively link computers, all machines in the network should run the same software. Only ORACLE provides standard software on mainframes, minis and micros. Data and programs can then be shared among users of different machines, distributing the workload.

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Big Blue software push needed

From page 25

> *'Police your software budgets like they were phone bills. Ask IBM for deals, and take an aggressive posture on software purchases.'*
>
> **— H. Michael Braude**
> **Gartner Group**

But IBM will not be alone in working to exploit hardware advances. Braude said independent vendors have been slow to capitalize on such features as the 31-bit addressing capabilities of XA systems. "Will the independents be able to retool their products to take advantage of new architectures?" he asked. "I think they must. They have to reinvest in their systems; that is the basis for future growth."

IBM's second goal is to facilitate customer growth. That growth primarily involves supporting applications development, which fuels processor and storage system purchases. Thus, IBM will be forced to address the productivity issue by boosting the performance of its DB2 relational data base management system (DBMS) and providing a fourth-generation language, data dictionary and productivity tools similar to those being offered by the independents like Applied Data Research, Inc. and Cullinet Software, Inc.

Braude said DB2 will likely become more performance oriented eventually, but 1986 could be a rough year for the relational system as users get firsthand experience with it and unearth problems.

Considering the impact of the computer industry slowdown on the software market, perhaps the most difficult of IBM's tasks will be to increase its software revenue at its hoped-for 45% compound annual growth rate. A recent Gartner Group survey indicated that users' software budgets will grow, at most, 35% this year.

So, Braude said, IBM will have to make up the shortfall with increases in software prices based on what he labeled "value pricing," that is, adding functions and cost to existing packages. The significant price increase witnessed this year by IBM IMS DBMS users for the system's Extended Recovery Facility, announced in February, is one of a growing number of examples of value pricing.

To respond to such pricing moves by IBM, Braude said, users will have to assert control over their software budgets and take the initiative in making deals with vendors. "Police your software budgets like they were phone bills," he said. "Ask IBM for deals, and take an aggressive posture on software purchases."

Finally, Braude said, IBM will continue to take steps to protect its software assets through extensions of the object-code-only policy, which restricts the distribution of source code materials. In order to implement that policy more widely, he said, IBM will have to bolster its support facilities.

"IBM has to deliver added value to justify its revenues," Braude said. "And it has to make its advanced technologies work, including DB2 and SQL. Its progress has been disappointing there so far. IBM must move into the high-end productivity tool business and organize itself to sell software."

SQL evolving into standard

Braude said SQL will evolve into an industry-standard data interface. He said users should not be looking at whether a data management system is relational in the strictest sense but whether it supports or will support SQL. "SQL is a key issue," he said. "It will handle the relational debate. Users should be looking at SQL as a strategy."

Braude described IBM's much-heralded LU6.2, which supports data sharing among applications transparent to machine environments, as a new infrastructure and "a network operating system." Other software vendors must move to embrace LU6.2, a step many of them will take in the near future, he predicted. But above all, IBM itself must come to realize the importance of LU6.2.

"If IBM really wanted to move LU6.2 along," Braude said, "it would provide LU6.2 development tools for building programs with LU6.2 support. But IBM is still looking at LU6.2 as a communications driver rather than an applications enabler."

IBM's unveiling of its Token-Ring local-area network, while disappointing on its own, was a statement of direction on IBM's part. "IBM made LU6.2 accessible on a Personal Computer," he said. "Software and hardware vendors have to understand the strategic importance of that."

Other software moves likely to come from IBM include the following:

- The introduction of common subsystems, such as CICS and VSAM, across operating systems. An example is the recent introduction of CICS/CMS.
- A push toward expert system management of large data centers. IBM is currently developing such a system known as the Yorktown Expert System.
- IBM will use its Cross Systems Product as a simulated data dictionary supporting a single definition of data for multiple environments.

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Emulation systems bow

From page 25

gram interface macros that can let host-based applications automatically begin file transfers to and from IBM Personal Computers and compatible microcomputers, Moore said.

"The [personal computer] need only be turned on," he said. The program transfers mainframe files over 3270 coaxial networks and also converts them to PC-DOS formats under the Fortenet utility PC Command. The mainframe's increased ability to manage data in a personal computer format also reinforces data base security, he added.

In its first form, Fortenet enabled files to be transferred without special PC-DOS programs or 3278 emulation-mode requirements.

The updated Fortenet transfers files at up to 7,000 char./sec. at a 75% CPU load, increased from a 3,000 to 6,000 char./sec. rate in the earlier version, Moore added.

"We consider ourselves evolving from emulation to information transfer," Moore said.

Fortenet replacement

Fortenet II, which will be ready for shipping in December, will replace the current version of Fortenet, he said. It has the same $1,000 licensing fee as the current version, including PC-Command, for use with the Forte/PJ 3270 emulator.

Program modules to write macros for a personal computer interface are an additional $2,000. Upgrades from the first version will be available for $500.

Forte also enhanced its existing IBM Personal Computer 3270-compatible software, out about eight months, to a new version that emulates the 3270-PC advanced workstation. It includes a High-Level Language Application Program Interface (HLLAPI), equivalent to the IBM 3270-PC HLLAPI, which allows applications developed on IBM 3270-PCs using IBM's HLLAPI to run under the Forte 3270 PC.

The upgraded version also supports the IBM 3270 122-key keyboard and its special-function keys and emulates Models 3, 4 and 5 for their specific additional capabilities. The new release also offers foreign language support for several languages, with more promised in February.

It also will be available in December as a free upgrade to current users and will be licensed at $495.

Moore said this "fills out the product" and promises Forte will solidify its capabilities with more, minor enhancements in the next year.

The company also recently introduced the Fortegraph APA, for interactive access to IBM's advanced All-Points-Addressable host graphics, also based on the Forte PJ 3270 emulator.

Sequent unit gains Ada use

BEAVERTON, Ore. — A parallel implementation of the Ada language for Sequent Computer Systems, Inc.'s Balance 8000 parallel processors was announced jointly by Sequent and the Verdix Corp. of Chantilly, Va.

The product will allow Sequent to participate in the growing market created by the U.S. Department of Defense's mandate that Ada be used to develop mission-critical software systems, according to Sequent spokesman Gary Raetz.

The Verdix Ada Development System (VADS) allows Ada developers to take advantage of the parallel architecture of the Balance system. Sequent will assist in marketing, sales and promotional efforts. The company will work closely with Verdix in the adaptation of VADS to the parallel environment of the Balance 8000.

VADS will be available in first-quarter 1986 in a version that is not optimized for parallel computers. This product will be followed in the second quarter of the year with an upgrade version optimized for parallel processing, Raetz said.

On a two-processor system, VADS costs $15,000. For four to eight processors, the price is $25,000; and for 10 to 12 processors, the system costs $40,000. No pricing structure has yet been determined for the parallel processing version.

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IBM exploits AT/370

From page 25

> *'There were two big problems with the AT/370. . . . IBM has essentially addressed one and a half of those problems.'*
>
> **— Thomas Foth Adesse**

significant paging, it ran like a real dog," Foth said. "That was a problem for developers because compilers, like [IBM's] Cobol VS, were written for environments with strong paging abilities. Now, a good deal of paging will be done at memory speeds rather than at disk speeds. That dramatically improves performance for applications that page a lot, specifically things like compilers. You can finally run a compiler with some efficiency on an AT/370."

The announcement does not affect the XT/370, Foth said, because users cannot expand the machine's memory beyond the 640K-byte line and cannot create a page cache.

Foth said IBM's performance improvement figures were probably overly cautious. IBM used a maximum of 1.5M bytes of expanded memory for its benchmark tests. With greater added memory — users can add up to 16M bytes, Foth said — the AT/370's performance in processing complex applications with heavy paging requirements would be vastly improved.

"It's a really great use for that type of memory," he said. "For a lot of compiles you would never have to page to the disk. When you are not paging to disk, performance is great."

Just as significant, Foth said, is the added ability of AT/370s to participate in the PC Network. With some additional enhancements, a cluster of some 20 AT/370s could take the place of an IBM 4300 series mainframe for most applications development groups, he said.

"I can envision these programmers working at a bunch of AT/370s, sharing data, and only one of the machines would have to be hooked into the mainframe," Foth said. "There are certain tasks, like really large compiles, that would be more efficient on the mainframe. But the development and testing of most applications could be done on that network."

What's missing, Foth said, is the ability of AT/370s on the network to share mass data storage facilities and the absence of virtual machine-to-virtual machine communications capabilities.

Mainframe software exists that allows an application running in one so-called virtual machine within VM to share data with a program running in another virtual machine. He said IBM or another vendor will likely soon rectify those shortcomings.

"There were two big problems with the AT/370," Foth said. "The first was performance, the other was the need to allow developers at workstations to share code. IBM has essentially addressed one and a half of those problems. The AT/370 has become a very adequate workstation, and that is significant. It indicates that IBM is not going to let this product die."

What would really solidify the AT/370's role as a key workstation product for IBM — and probably significantly boost sales of the machine — is a faster microprocessor foundation.

Is IBM betting on the AT/370 to carry out its as-yet-unrevealed workstation strategy? That remains to be seen. But as Foth and other development gurus have attested, application developers and others concerned with programmer productivity should keep close tabs on AT/370 developments.

TI announces the portable sales tool for General Electric Plastics' field communications.

Instant access with their technical data base and 24-hour communications with headquarters. That's what the SILENT 700™ Model 707 with its easy access module means to GE Company's Plastics Sales Division. Regardless of time zones and sheer distance from the home office, GE Senior Sales Representative Ray Forester can get the latest product data and cost analysis information he needs to prepare for and close a sale. All he needs is his TI 707 portable data terminal and a telephone.

"With the terminal, I can tap into GE Plastics' data base. When ERIS (Engineering Resins Information System) is accessed by my TI 707, I can provide a customer with technical information and product specifications on the spot and leave him with a printout to review.

"The terminal also acts as my message center when I'm in the field. I transfer messages through the GE Crossfile (electronic mail), and the individuals receive them in written format when they pick up their messages. They seem to respond more promptly with accurate, hard copy in front of them. And since I can receive messages anytime, anywhere, the TI 707 all but eliminates 'telephone tag.'"

Ray Forester believes that the TI 707 is ideal for the salesman on the go. It's lightweight and rugged, takes up approximately one half of a briefcase, and is quiet even at peak operation. "It's exactly the productivity tool we needed for our division's field communications," he concluded.

Find out about the Model 707 SILENT 700 Portable Data Terminal from TI and how it can solve your communications problems. Call 1-800-527-3500, ext. 709; in Canada, 416-884-9181. For more information write TI, P.O. Box 809063, Dept. DTB 1930W, Dallas, Texas 75380-9063.

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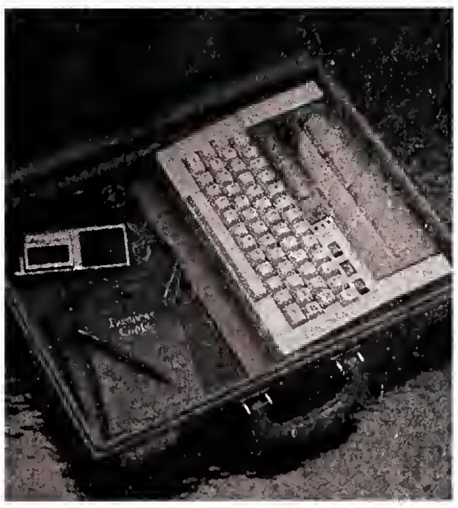

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The power to share

The Tandy 3000 is also designed to use the forthcoming XENIX 5.0 multi-user operating system. Two to six people in an office can use the 3000 simultaneously with low-cost data terminals.

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The Tandy 3000 comes with an 80286 cpu for the ultimate in speed and performance. Its 16-bit architecture operates at 8 megahertz—twice that of the industry standard.

The Tandy 3000 comes with one-half megabyte of main memory (512K RAM). Memory can be expanded to 640K without using an expansion slot. Total internal memory can exceed 12 megabytes (under XENIX).

As for storage, the Tandy 3000 (25-4001, $2599) comes with a high-capacity, 5¼″ floppy disk drive. For the utmost in compatibility, this drive can read 1.2-megabyte and 360K formats for use with IBM PC diskettes.

Extra storage and expandability

For maximum capacity, choose the Tandy 3000 HD (25-4010, $3599) with a built-in 20-megabyte hard disk drive.

Both versions of the Tandy 3000 feature a built-in real-time clock, a serial/parallel interface, and ten expansion slots, including seven IBM PC/AT-compatible slots, two PC/XT-compatible slots and a PC/XT-compatible half-slot for the serial/parallel interface.

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MICROCOMPUTERS

SMALL TALK
Thomas Madron

Broadband vs. baseband

With a joint announcement by IBM and Texas Instruments, Inc. on Oct. 15, IBM's much-touted Token-Ring local-area network was finally unveiled, a little more than a year after IBM's broadband PC Network.

The Token-Ring network is based on a joint development program between IBM and TI, originally announced in 1982. The outcome of that development effort was the TMS380 adapter chip set, which meets the ANSI/IEEE Standard 802.5 specification as well as the European Computer Manufacturers Association 89 standard for token-ring, baseband local-area networks.

The Token-Ring's data rate will be about 4M bit/sec. This compares with the 2M bit/sec. rate for the PC Network and 10M bit/sec. for Ethernet systems. While these rates seem fast compared with terminal-oriented networks operating at 9.6K to 19.2K bit/sec., they still do not match channel speeds of 24M to 48M bit/sec. common on IBM mainframe systems. All the network data rates quoted are somewhat misleading since actual loading of the networks can affect performance and affect the throughput an end user sees.

While the new IBM net initially will connect IBM Personal Computers, the chip set, properly configured, will allow a wide range of information processing devices to be connected in a single network.

Like many other local nets now on

See **BROADBAND** page 40

Madron is manager of computer services at North Texas State University in Denton, Texas.

DRI unveils polished GEM

Two applications released with redesigned programs

By Peggy Watt

Apple Computer, Inc., which threatened Digital Research, Inc. with a lawsuit over Digital Research's Graphics Environment Manager (GEM) software, has indicated that the revised GEM software is sufficiently different from the Macintosh to pass legal muster. Earlier this month Digital Research released the revamped products.

The original GEM Desktop and accompanying GEM Paint and GEM Draw applications, which run on the IBM Personal Computer and compatibles, were not yanked immediately from computer store shelves but will be replaced in shipments scheduled to begin last week.

An out-of-court settlement was reached last month between Digital Research and Apple, which claimed Digital Research's programs too closely resembled the "look and feel" of its Macintosh interface, Macwrite and Macpaint programs.

Digital Research redesigned a few icons, thickened a few lines and boxes, switched the location of a few menus and commands and added a few enhancements that it had planned on plugging into the next releases anyway. The trash can icon disappeared in favor of the more standard "delete" option. "I guess Apple feels it has the monopoly on trash," a Digital Research designer quipped.

Accompanying the revamped programs are two new GEM applications, GEM Wordchart and GEM Graph.

Wordchart, intended to create charts and displays used in lectures and presentations, features a host of fonts, sizes and colors with such built-in formats as columns, outlines and automatically centered text. It will ship in December with a suggested retail price of $139.

The drawing-based Graph offers a menu

See **DRI** page 36

Compaq Loral bows

HOUSTON — Compaq Computer Corp. has unveiled a version of its Portable 286 system that meets the federal Tempest standards for suppression of electromagnetic radiation.

Designed for applications where security is a particular concern, the new Loral 3100T Compaq Portable 286 incorporates a removable 20M-byte hard disk drive.

Compatible with the IBM Personal Computer AT, the new machine will cost $11,999 and begin shipping in January.

Latest Sidekick goes on the road

By Peggy Watt

SCOTTS VALLEY, Calif. — Diehard users of Borland International's Sidekick productivity program now can take Sidekick-managed information on the road even if the personal computer is not traveling along.

On-line accessories collected with Sidekick, which runs on IBM Personal Computers, can be transformed to more mundane paper form, inserted in an accompanying binder and tucked into a briefcase with the new $69.95 Traveling Sidekick program.

Under a report writer section, Traveling Sidekick prints out data in Sidekick's address and appointment files in three different formats — phone list, address book and mailing labels — and sorts it by name, company or ZIP code.

Under the program's day timer section,

See **SIDEKICK** page 36

INSIDE

Paladin introduces its icon-driven Super Crunch spreadsheet package for the Apple Macintosh/**32**

NEW THIS WEEK

- The Software Clearing House offers Versanet
- Unisource Software ports RM/Cobol to personal computers
- For more on these and other new products, see pp. 83-98.

INSTANT ANALYSIS

"A microcomputer manager's association in California disbanded this year. They had met for several years, discussing microcomputers only, and felt that they had discussed all the issues — some several times."

— Warren Kress, president of Connect, an association for managers of end-user computing

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Micros hooked to Sperrylink

BLUE BELL, Pa. — Sperry Corp. Information Systems Group has announced a software program that gives Sperry micros, IBM Personal Computers and compatible systems a link into the Sperrylink office information system.

"Basically what we've done is rewritten [Sperrylink] for the [Personal Computer]," said Howard Kearns, director of marketing support for the company's office information systems division."Now we have a fully integrated product line."

Designed to run on microcomputers with 640K bytes of internal memory and a hard disk drive, the Sperrylink PC connects the micro to the company's Series 1100 mainframes or DOPS/20 departmental processing systems, Sperry said.

The menu-driven product includes word processing functions and online access features. It can also create personal files and a system directory and perform file searches.

In addition, standard Microsoft Corp. MS-DOS files can be converted to Sperrylink files or vice versa, the company said. MS-DOS-based spreadsheets, for instance, can be converted to the Sperrylink system and be incorporated into Sperrylink documents.

Sperrylink PC, which is priced at $400, will be available in January, Sperry said.

— **Rosemary Hamilton**

Paladin's Super Crunch Mac spreadsheet debuts

SANTA CLARA, Calif. — Paladin Software Corp.'s Super Crunch, a spreadsheet for Apple Computer, Inc.'s Macintosh, may well distinguish itself as the first spreadsheet that talks back, because it includes a speech-output feature designed as a proofreading aid.

But Paladin is counting on other features to gain this upgrade of its 6-month-old Crunch package a close second place to Microsoft Corp.'s Excel in the 512K-byte Macintosh spreadsheet market. Planning to deliver the $295 Super Crunch package by year's end, Paladin hopes to ride the coattails of the Microsoft product in legitimizing the Macintosh's position among power users.

The decision to buy Super Crunch rather than Excel or Lotus Development Corp.'s Jazz will rest not upon speed or power but rather upon a choice for a working style that makes ease of use a priority, Paladin President Ted Newlin said.

Like Crunch, the icon-driven Super Crunch aims to exploit the Macintosh's graphics-based interface to the fullest. To choose from among typical spreadsheet features, the user points at the icon with the mouse and clicks.

Selecting spreadsheet features via icons, users will make 50% fewer keystrokes per application than they would with Excel, according to Katie Osgood, product marketing manager.

Newlin said corporate buyers, particularly MIS managers, could benefit from Super Crunch's macros that can be customized for vertical applications.

At the same time, Super Crunch was designed to provide the new user with "accessible power," Newlin said. The program's more sophisticated options remain invisible until the user is ready for them, he added.

The Super Crunch upgrade makes Crunch a more versatile package, Paladin said. The original version had 21 icons along the icon bar; Super Crunch will provide a palette comprising 63 predefined and user-definable icons.

Other enhancements will include a three-dimensional work sheet with a depth of 250 work sheets; cross-tabbing in the data base; auditing features including the "Say It" speech-output proofing function; and enhanced graphics capabilities, including exploded pie charts.

Crunch packages now being sold are marked with stickers that indicate a free upgrade.

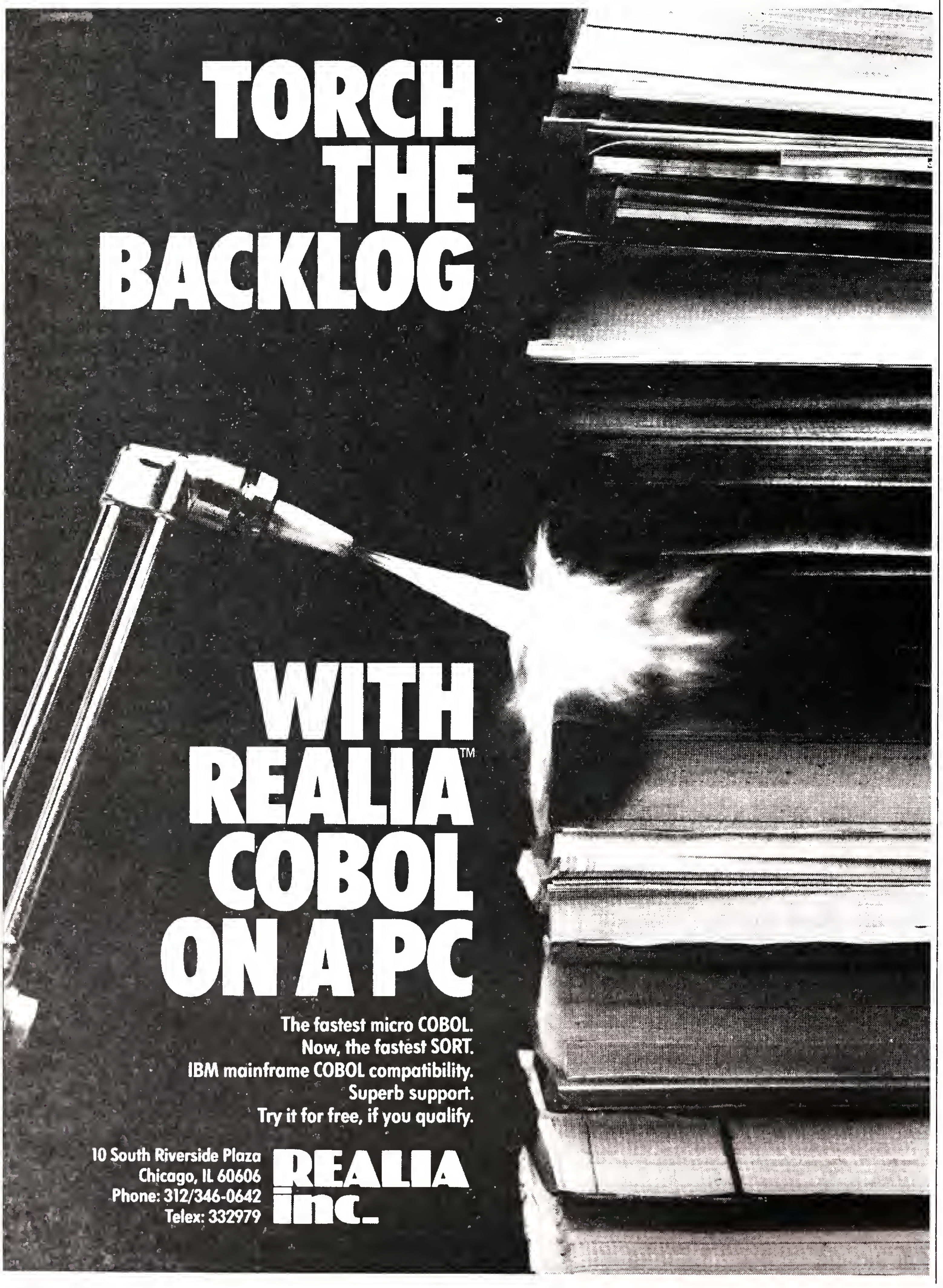
Chorus Data add-on board out

MERRIMACK, N.H. — Chorus Data Systems, Inc. has announced Compressit, an $995 add-on board for the IBM Personal Computer XT or AT said to reduce the disk space required to store bit-mapped images.

A continuous-tone gray-scale or color image will typically compress from 2:1 to 4:1, according to Chorus. Computer-generated graphics typically compress from 4:1 to 8:1, and black-and-white text or line drawings from a scanner may compress from 25:1 to 50:1.

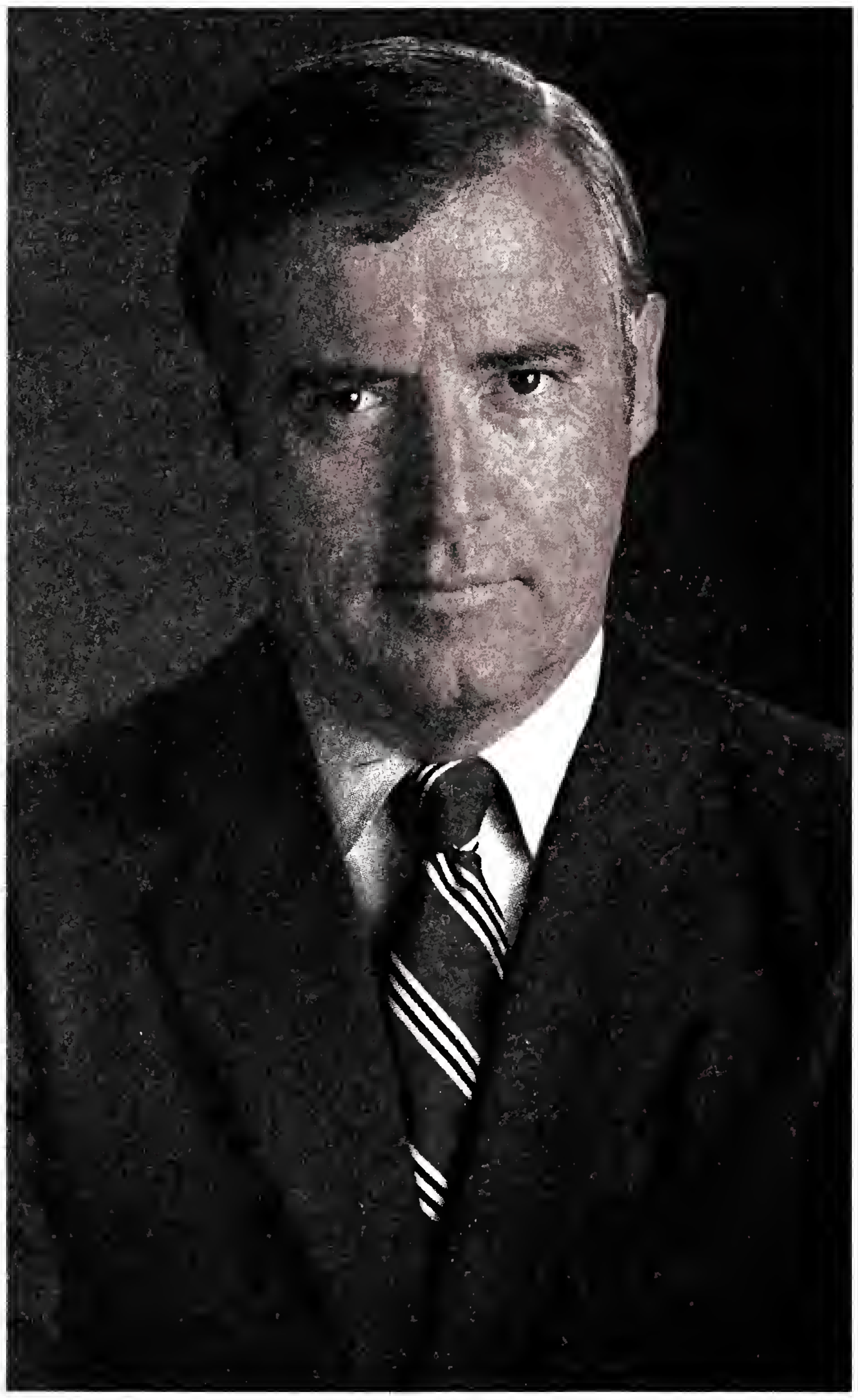
Compressit requires a single slot in the IBM Personal Computer expansion bus. It is said to execute its compression algorithms approximately 10 times faster than an assembler program could compress data on the XT and four times faster than data compression on the AT.

According to a spokesman, Compressit performance is achieved from the use of extended microcode addressing for the transistor-transistor logic microprocessor.



The time has come for straight talk about database management systems.

"The only reason to buy a database management system is to build better applications."



Throughout the history of the software industry, proponents of one database architecture after another have promoted their respective systems as the sole solution to a company's application backlog problem.

The early debate centered on hierarchical versus network architecture. Advocates of inverted file entered the argument in the 70's. And today, relational is the architecture of choice.

While this discussion about architecture is interesting, it's just not the issue.

Database management systems, beginning with the very first, were created to do one thing and one thing only —they were created to build better applications. *Building applications—efficient, online applications, faster, with fewer people—is the only real issue.*

Today corporations have a huge backlog to contend with. And the applications they need to develop have different characteristics. Some may be retrieval only. Some may be heavy on update. Some will run the company, and will require professional development. Some can be created by end users to satisfy their own needs.

It is extremely important to have a database management system that can handle all applications. *It is essential* that a database include tools rich and comprehensive enough to accommodate both the professional developer and the end user. It's the richness and power of these tools that's critical to the successful implementation of highly responsive fourth generation applications. What's demanded, in fact, is software that goes a *step beyond* today's conventional relational database systems.

With a comprehensive database management system and the appropriate tools like the kind I'm talking about, you'll make the data processing department a *strategic asset* instead of corporate overhead. You will make your company succeed in a highly competitive world.

In Cullinet's new Annual Report, Presidents and CEO's of major corporations speak about the positive impact Cullinet has had on their operations. For a copy that you might like to read and pass along to your company president, write to me. I'll see that you get one.

John J. Cullinane
Chairman of the Board

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The only database management system worth buying is one that meets these six requirements.

Stated simply, IDMS/R is a step beyond today's conventional relational DBMS because it meets these key requirements for building successful applications.

1. MIS Application Development Facilities

The application development system required to build high performance production applications requires more than a fourth generation language. Cullinet's ADS/OnLine is a comprehensive application development environment for the MIS professional combining fourth generation language with a menu-driven modular development approach. Integrated with the data dictionary, this minimizes not just the programming but the entire design, development and documentation of an application. Furthermore, this approach produces a dramatic reduction in maintenance and support.

2. End-User Application Development Facilities

Because Cullinet recognizes the difference between production and end-user applications, as well as the need for both to share common data, we provide an easy to use end-user oriented development and inquiry system. The Automatic System Facility of IDMS/R is a non-procedural, menu-driven tool designed for end-users. Once data tables are defined, an application is automatically generated. The query facility of IDMS/R provides menu-driven query capability and full online help, so end-users can build working applications in minutes and get reports easily and efficiently.

3. Relational Architecture

IDMS/R allows for the definition of databases using the relational data model. Data tables and associated user views are easily defined online. Additionally, any number of key fields may be defined. IDMS/R also supports advanced relational features including referential integrity and domain definition. This architecture provides the capability to address all application requirements.

4. High Performance Database and Application Tuning Facilities

IDMS/R is a full multi-tasking, multi-threaded system providing for concurrent processing of on-line and batch, update and retrieval applications. Additionally, tuning facilities provide efficient indexing techniques, space management, page management, and buffer management. No conventional relational DBMS has these capabilities.

5. Dictionary Driven DBMS

Data integrity and data independence are essential in a DBMS environment. The dictionary actively controls the source and use of all data. Data definitions, data validation criteria, data formats and security are all defined within the dictionary and exist only once, eliminating redundancy and ensuring integrity. This information is then automatically used throughout the system. Examples of the functionality of this facility include never needing to define output formats for query; never needing to define field attributes for screens; never needing to code validation and editing criteria when using ADS/OnLine. Only IDMS/R provides this level of dictionary integration.

6. Open System Architecture

With the unique Open System Architecture of IDMS/R you can maximize your investment in existing software. IDMS/R accepts data from outside the database environment with direct access to VSAM files. In addition, applications written to access other databases like IMS, DL/1, TOTAL, or VSAM can directly access IDMS/R without modification. IDMS/R is designed to work in virtually all IBM mainframe operating systems and teleprocessing monitor environments.

IDMS/R: More than a relational DBMS

Cullinet

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AST plunges into IBM Netbios-compatible network mart

Releases network, gateway, interface tool, security software

By Donna Raimondi

IRVINE, Calif. — Four products that support the IBM Netbios-compatible local-area network market were released last week by AST Research, Inc.

The 4½-year-old company believes that IBM networking will become the industry standard and is committed to providing Netbios compatibility in networks, said spokeswoman Karen Chillemi.

IBM's recently announced Token-Ring network will most likely become the backbone of networking, with other vendor's nets hooking into a companywide system, she predicted.

Network links 64 micros

The AST-Resource Sharing Network links up to 64 IBM Personal Computers, Personal Computer XTs or ATs with a data transmission speed of 5M bit/sec.

The network adapter, which costs $495 per node, includes RG-59 coaxial cable to link nodes; an on-board intelligent controller to off-load the host personal computer; and support for up to 1,500 ft of cable without the need to add signal repeaters, translators or access units.

A starter kit consists of two network adapter cards, cable and the software needed to link two Personal Computers and costs $1,195.

Gateway introduced

AST also released its IBM Systems Network Architecture/Bisynchronous Connection Gateway, a hardware and software package that allows communication between up to 32 IBM microcomputers and a host IBM mainframe.

The $1,795 gateway board is installed into one microcomputer on the network, transforming the micro into a master gateway that emulates an IBM 3274 or 3276 cluster control unit.

The remaining microcomputers in the network emulate 3278 and 3279 Model 2 display terminals communicating through the gateway to the host.

User interface software

Additionally, the company announced an AST-Network Program that costs $75 per node. The software is a user interface that facilitates sharing of data files, printers and hard-disk storage devices. The package uses IBM PC-DOS-like commands to simplify the task of selecting and managing network resources.

The package, which requires 128K bytes of memory, is said to be totally compatible with IBM's PC Network Program at the user command, server and Netbios levels.

A new version of AST's Knight Data Security Manager program, that costs $395 per network, is said to deliver password protection, a PC-DOS interface, usage auditing, electronic mail capabilities and a data encryption option. It protects both floppy and hard-disk storage devices, the vendor said.

Sidekick program goes on the road

From page 31

Traveling Sidekick can print Sidekick's calendar and appointment files in daily, weekly, monthly or yearly calendar formats. The printouts were designed to fit a 9-in. by 8-in. by 1¾-in. black vinyl binder included with the program.

New information can be added to Sidekick through a Traveling Sidekick input form.

The Traveling Sidekick day timer notebook contains travel data and pockets for receipts, business cards and other materials as well as reference pages for Borland products.

Traveling Sidekick is not copy protected, runs with Sidekick Version 1.5 and subsequent releases on the IBM Personal Computer and compatibles and requires 256K bytes of random-access memory.

The pair of products costs $154.90, but will be available for $124.95 in an introductory special through March 31.

DRI unveils polished GEM

From page 31

of eight types of graphics to illustrate data, including symbol charts and a map, as well as the traditional pie chart and bar graph, also available in a three-dimensional version. Text can also be inserted. It sells for $249.

Digital Research noted that 100,000 copies of GEM applications, half of which are retail versions for the IBM Personal Computer had shipped by early November.

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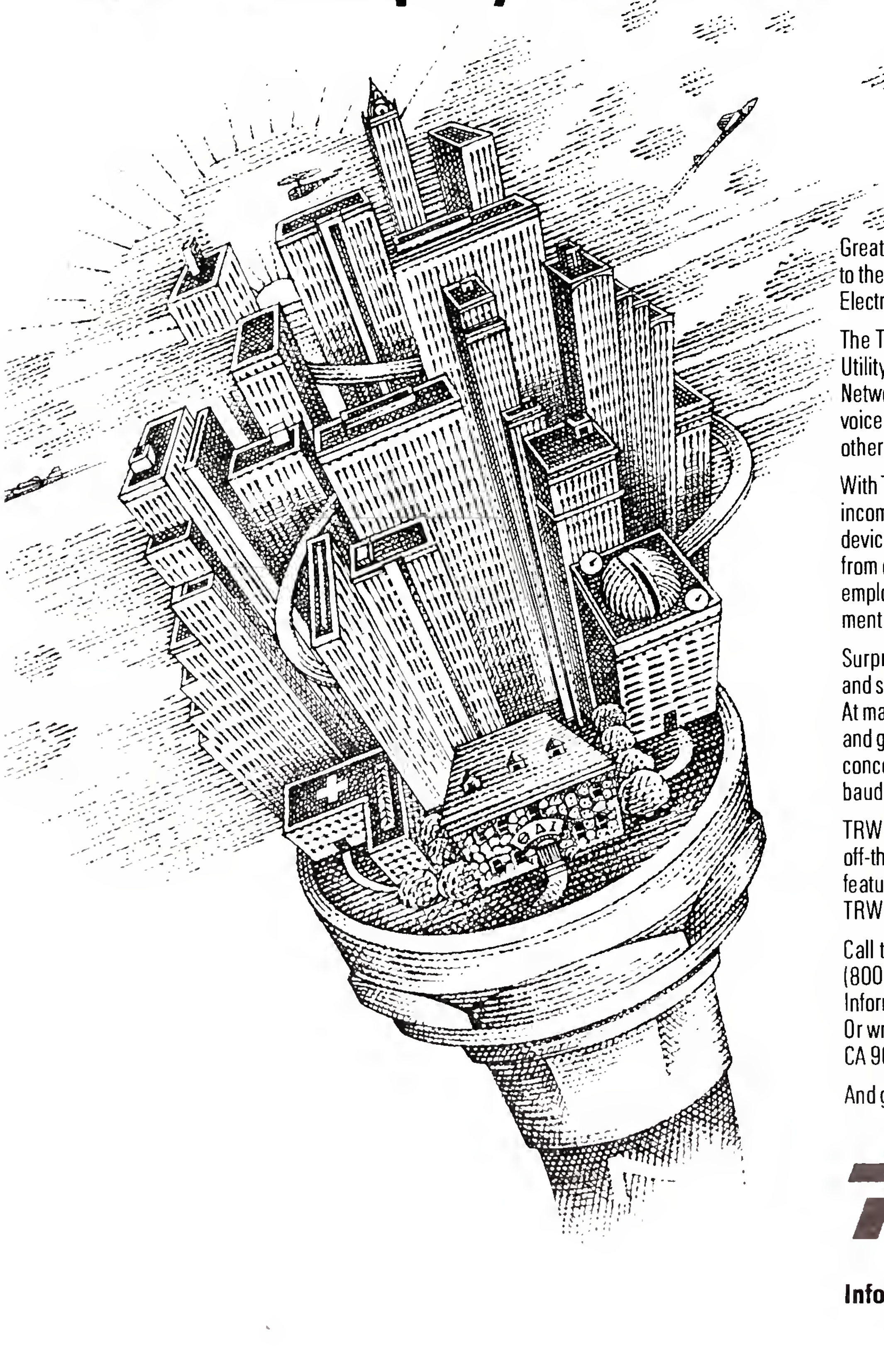

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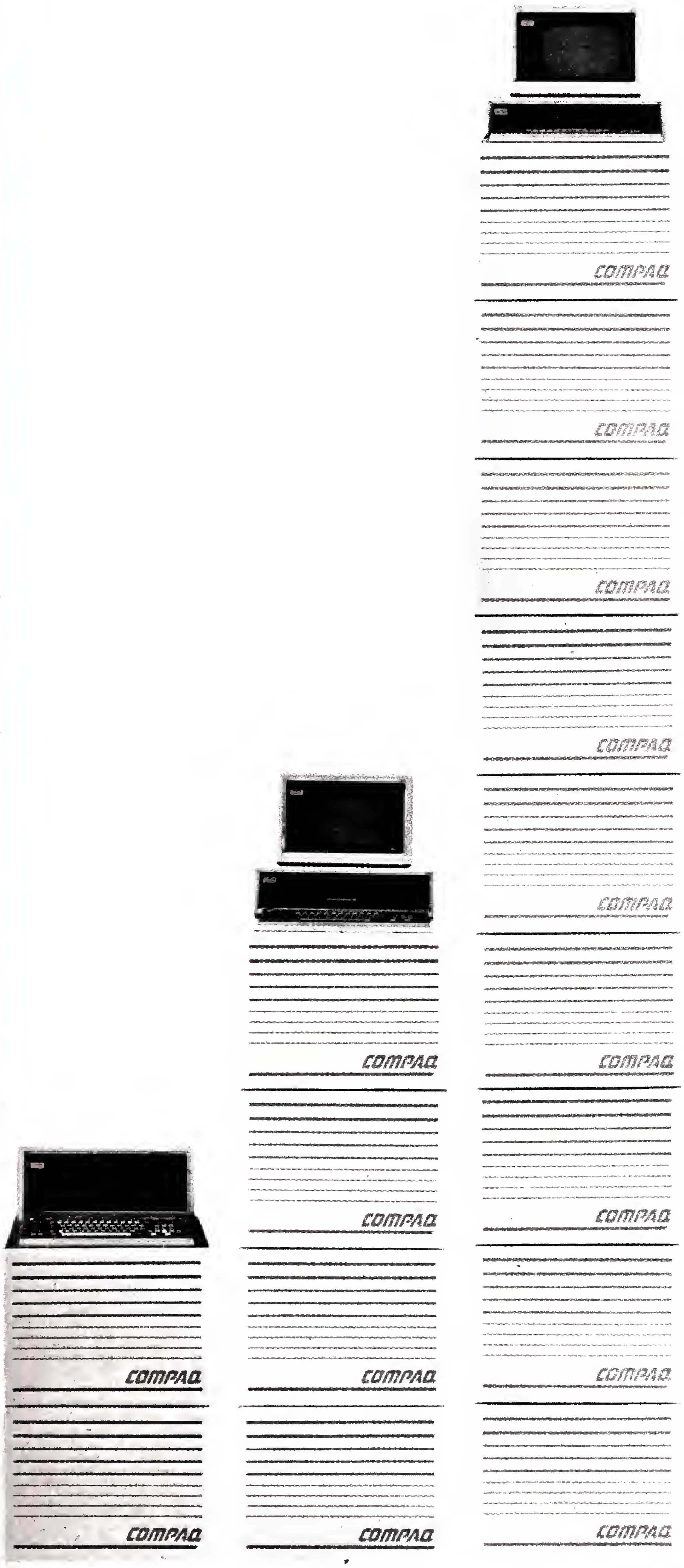
It's not that COMPAQ is the fastest growing computer company in the world...



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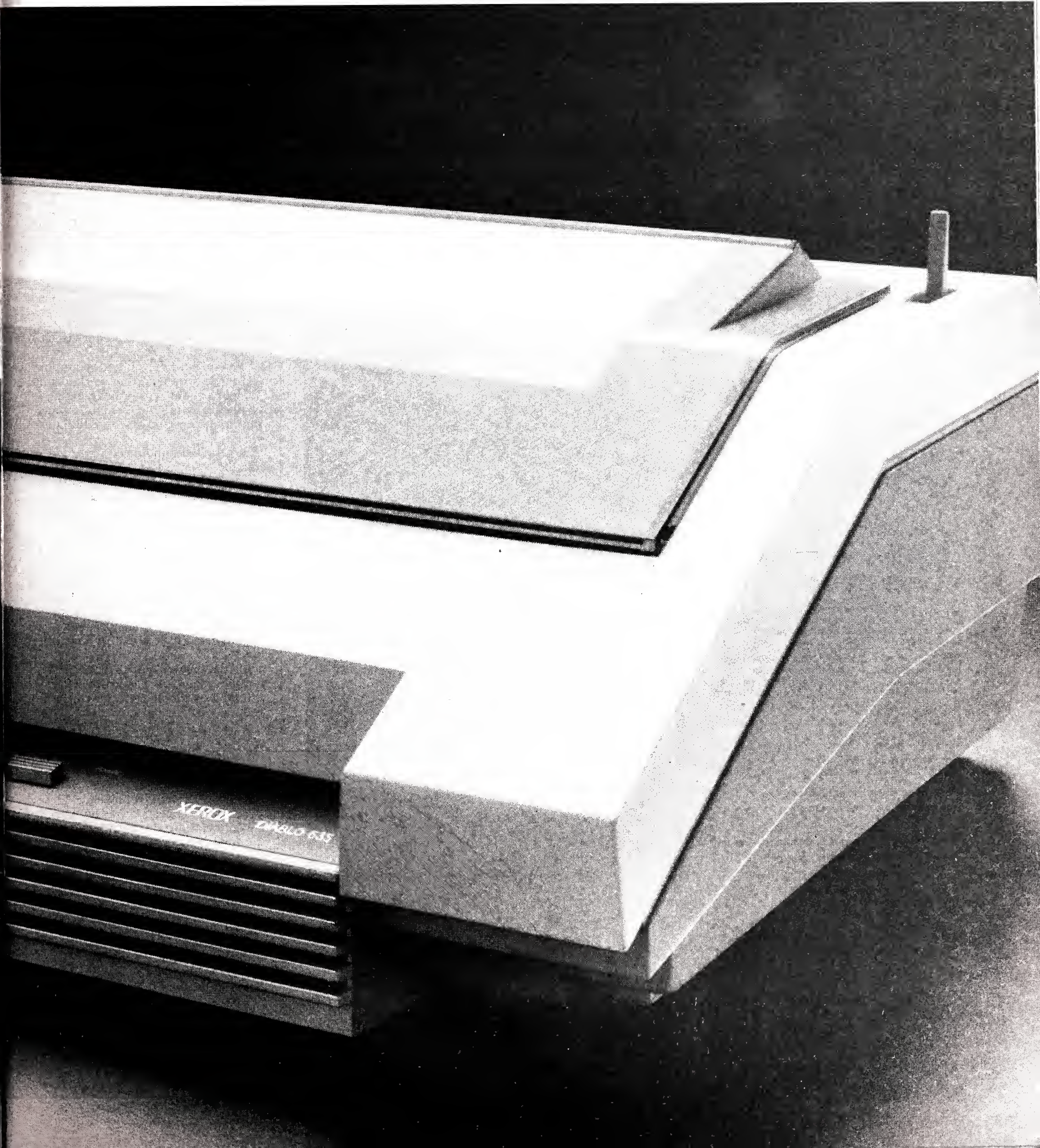

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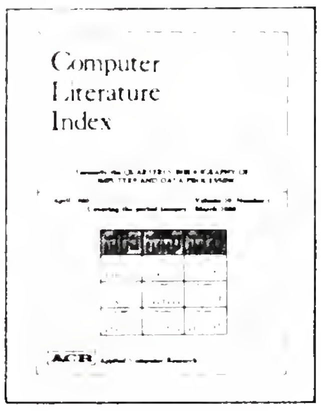

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Broadband vs. baseband

From page 31

the market, IBM's Token-Ring was designed to run over "already installed" unshielded telephone twisted-pair copper wire, as well as shielded twisted pair and fiber optics.

Unfortunately, in most real operating environments, the usefulness of already installed twisted pair is more marketing hype than reality.

First, in many organizations, the telephone wiring is not owned by the company but rather by the building owner, a telephone company or some other entity.

And when telephone systems are replaced, even if the same telephone service system obtains the successive contract, new wiring almost always is installed.

No one knows where wiring goes

One of the major reasons is that most telephone wiring is undocumented. No one really knows where it goes or, in many cases, what it does.

Secondary uses of telephone wiring also may interfere with the primary use for voice communications, depending on the kind of switch or private branch exchange in service.

An organization can, of course, follow IBM's suggestions and not only wire for telephones, broadband video and data services but also wire with Big Blue's Cabling System.

The Cabling System, announced in 1984, contains both twisted-pair and fiber-optic cables. The state of the art in fiber optics currently precludes its effective use for most local net applications at the present time, although this will likely change over the next five years.

Token-Ring net limitations

The Token-Ring network has some potential limitations that differentiate it from the broadband PC Network. Like the broadband system, the Token-Ring has an initial limitation of 72 connected devices, at least when used with Type 3 telephone media. When used with data-grade media, however, the number rises to 260.

The initial limit on nodes supported by the broadband network also is 72 devices, but with a head-end translator available from Sytek, Inc., that number could rise to 1,000 devices.

When IBM announced its broadband PC Network in 1984, it also indicated that the operating software architecture announced at the same time would become standard for its other networks as well.

The four networks of IBM

IBM seems to be developing four networks: the PC Network, the Token-Ring, an industrial token-bus system and an apparent software overlay for mainframe 3270 networks, at least at the 3274 controller level.

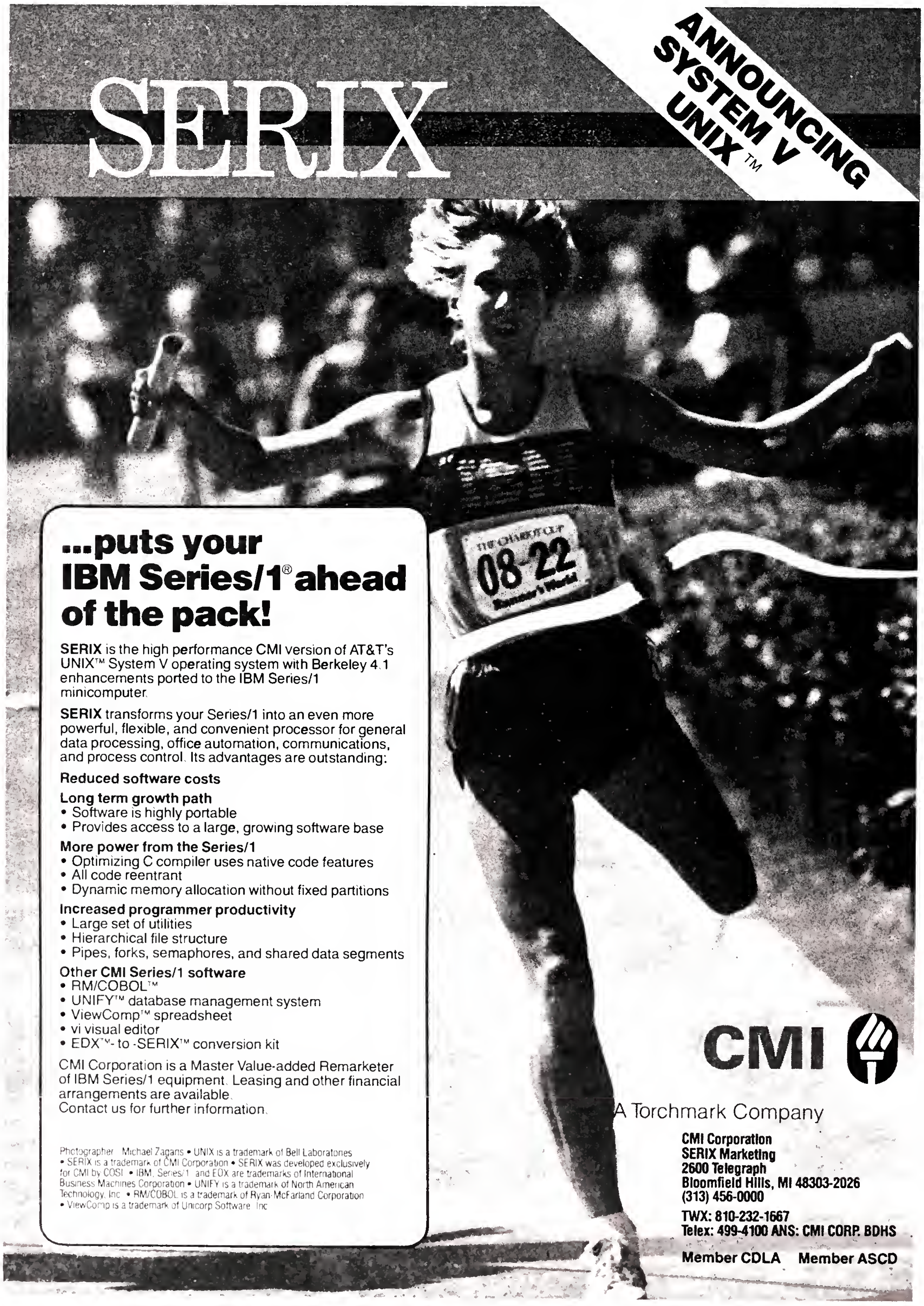
If IBM carries out its original intentions, then all these networks should look much the same to the end user.

It is not at all clear that IBM's network software will or can become the standard. Clearly the software distributed for the PC Network will function best in a very small, homogeneous office environment.

In many respects other networking software products that run on the same hardware — Novell, Inc.'s Netware being a prime example — offer a better, more functional architecture. They also run on many kinds of non-IBM hardware.

As a final note, it will be interesting to see how IBM's marketing people deal with yet another net. The marketing people are just now beginning to be able to discuss nets in general and the PC Network in particular — but not in a very detailed fashion.

They should have a good time trying to explain the relative merits of broadband vs. baseband, Carrier-Sense Multiple Access/Collision Detection vs. Token-Ring and coaxial vs. twisted pair.



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HARD TALK
James Connolly
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Apollo founder sets new goal

While he may be moving into what he sees as an open market with no competition, outgoing Apollo Computer, Inc. founder John William Poduska may be setting some very high standards for himself.

Poduska, who reportedly has surrendered much of his day-to-day operating power to Apollo Chief Executive Officer Thomas A. Vanderslice in the past year, is venturing out to start yet another company, making yet another type of workstation. It is a workstation that Poduska said won't compete with Apollo's design workstations or even with the high-end workstation that Apollo plans to produce in cooperation with minisupercomputer maker Alliant Computer Systems Corp. and IBM-compatible workstation maker Spectagraphics Corp.

What Poduska plans to produce in an as-yet-nonexistent factory to be located someplace along the Massachusetts-New Hampshire border, with a nonexistent staff and an undeveloped business plan, is a networked graphics workstation that executes 20 to 30 million instructions per second. And, he plans to deliver a product in less than a year and a half.

"If he could do it in five quarters that would be awfully quick," summed up International Data Corp. analyst David Moschella.

In pure processing power, the workstation to be produced by Poduska's company, which has the working name "Newco," is intended to be only slightly slower than a high-end Alliant configuration but with much greater graphics

See **PODUSKA** page 45

DG boasts high availability

Eclipse supermini features fault tolerant-like methods

By Donna Raimondi

Data General Corp. is being careful not to call features of its new high-end Eclipse MV/20000 machine fault tolerant. But what DG refers to as Shared Highly Available Resource Environment (SHARE) features, while not traditional hardware fault tolerance, are said to give users of the uni- or dual-processor models methods for staying up when elements of the system are crashing.

DG is quick to point out that these features, dedicated to keeping users up and running, do not constitute a fault-tolerant strategy within the company.

High availability has always been an issue with users, according to Omri Serlin of Itom International, a research and consulting firm in Los Altos, Calif. Serlin, who watches fault-tolerant technology, saw little that was unusual or new in DG's SHARE offerings, he said, but noted that the features are becoming more possible to offer at prices a user can swallow. "DG's high-availablity features are simply a response to increased user expectations. They are not dramatically different than other vendors' offerings," he said.

Laura Stewart, director of distributed systems at the Yankee Group in Boston, agreed that availability features have become a market requirement that hardware vendors must address. "What they have done was required in the market," Stewart said, "and they seem to have well implemented the technology that will keep them competitive."

DG and Serlin both said that the most important features of the MV/20000's availability offerings are in its mirrored-disk subsystems. Due to a change in the disk controller's microcode, DG's Model 6236 354M-byte drive and its Model 6239

See **DG** page 46

BITS & SLICES

Sperry memory expansion cost cut

Sperry Corp. has cut the price for internal main memory expansion of its mid-range 1100/61 and 1100/62 mainframes by about 40%, a move that is tied to its recent announcement that it is increasing the memory capacity in those systems from 4M to 12M bytes.

That memory increase was intended to help support Sperry's Mapper fourth-generation application development system, so Sperry is pairing memory expansion packages with Mapper. Memory is available in incre-

See **BITS** page 45

Laser disk-based systems offered

By Donna Raimondi

SAN RAMON, Calif. — Computime Computer Services, Inc. has unwrapped a $35,000 laser-optic mass on-line storage system and a $55,000 image processing system that uses optical media. Both products, Filebank and Imagebank, available now, are members of the company's Gigabank product line.

Computime, a private research and development company since 1981, went public recently and used the public funding to develop the laser systems, said Stanley Koder, the company's chief executive officer and executive vice-president. Koder said laser disk technology is available now, despite industry observers' claims that usable products are two years away.

Shelly Bakst of the market research

See **LASER** page 44

INSIDE

C. Itoh Electronics unwraps its first nonimpact printers, including ion deposition and color thermal printers/**44**

NEW THIS WEEK

- MDB Systems introduces two disk subsystems for DEC Q-bus computers
- Force Computers offers the CPU-5 for VME-bus
- For more on these and other new products, see pp. 83-98.

INSTANT ANALYSIS

"Every time I give a name of one of our OEMs, I get about five Japanese and a number of American vendors trying the get the account."

— John Robinson, of the optical disk manufacturer Alcatel Thomson Gigadisc

Pertec rallies with mass storage field entry

Firm's disk, tape products target OEMs

By Donna Raimondi

CHATSWORTH, Calif. — Four disk and tape storage products from Pertec Peripherals Corp. were introduced at the Comdex/Fall '85 show held last week in Las Vegas.

Three years ago, Pertec introduced an 8-in., 35M-byte device that turned out to be a near fiasco for the company, said Dominic Imonti, vice-president of marketing. "We were announcing 35M bytes, and the world was at 80M bytes and creeping up," he explained. "We were behind the power curve on that one." The newly announced products will prove the company's capability in the mass storage field, he added.

The products, targeted at OEMs, include two 8-in. Winchester disk drives, the DX548 and the DX368, that have capacities of 548M bytes and 368M bytes, respectively. Both units use oxide media and a storage-module drive interface that offers a transfer rate of 14.52 MHz. Optional dual-port versions are available, the vendor said.

The DX548 costs $5,300 in quantities of 250. It offers an average access time of 20 msec. The DX368, priced at $4,300 in quantities of 250, has an average access time of 18 msec.

The DP Series Data Package mass storage device incorporates either one or two Pertec DX series 8-in. Winchester disk drives and a power supply. It is configured in capacities from 199M bytes up to 1.096G bytes. Access to data is 18, 20 or 22 msec, at a data transfer rate of 9.67 or 14.52 MHz, depending on whether the company's previously released DX332 or the DX368 or DX548 drive is used.

Prices vary depending upon configuration. With a pair of DX332 drives, the DP332 package costs $5,300 in quantities of 250 and is immediately available. The DP368 device with dual DX368 drives costs $11,750; the cost for the unit with dual DX548s is $12,270 in quantities of 250.

The FS2000 ½-in. streaming-tape drive costs $6,500 in quantities of 250. It is a high-performance version of Pertec's FS1000. It has a front panel switch-selectable density feature (800, 1,600, 3,200 or 6,250 char./in.) and provides data capacities from 23M to 270M bytes unformatted. The 270M-byte capacity is achieved in the 6,250 char./in. mode on standard 10½-in. reels. Operating speeds are 25, 50 and 100 in./sec., switch selectable.

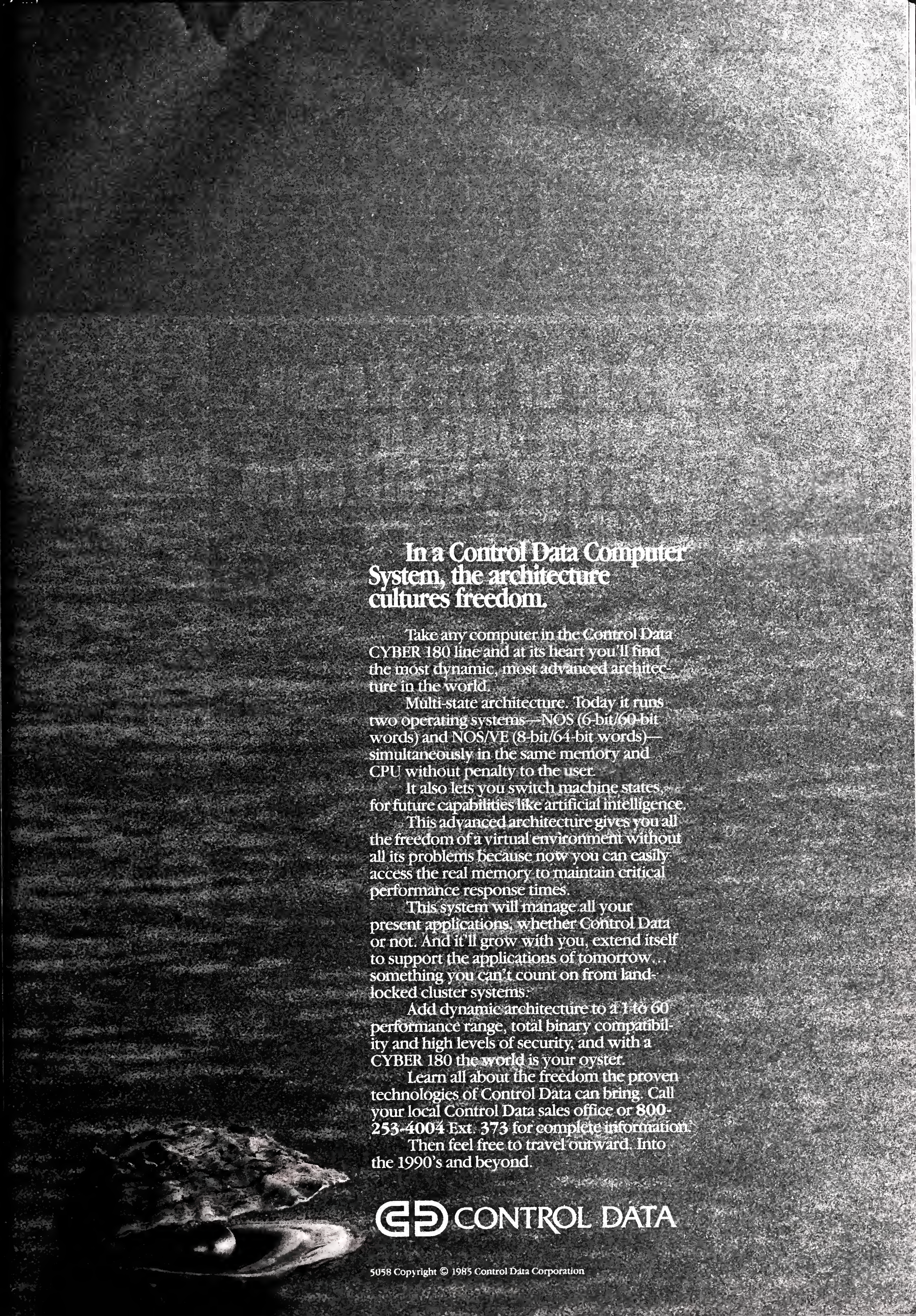
OSI 712 out from Isotron

By James Connolly

FAIRFIELD, Conn. — Isotron, Inc. has added to its line of AT&T Unix-based supermicrocomputers a refined version of its Ohio Scientific 710 multiuser system.

The OSI 712 was designed to allow systems integrators flexibility in configuring systems for office applications and industrial and laboratory control.

A company spokeswoman said the 712 and 710 use the same 10-MHz Motorola, Inc. 68010 processor and RTIX, Isotron's Unix-compatible operating system, but that the 712 was refined to make better use of the real-time RTIX. The basic 2M-byte 712 is bundled with Isotron's Uniplex integrated software package, supports three users and costs $8,900.



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C. Itoh unveils ion deposition, thermal printers

LOS ANGELES — C. Itoh Electronics, Inc. has announced a series of printers, including a three-speed letter-quality dot matrix printer and C. Itoh's first ion deposition and color thermal printers.

The nonimpact printers include four versions of 30 page/min and 45 page/min ion deposition printers jointly developed by C. Itoh and Delphax Systems. The ion deposition products, which are not yet named, were designed for use with systems ranging from high-end microcomputers through medium-size mainframes at prices of about $15,000, depending upon the desired resolution, a company spokesman said.

The TPX-80 color thermal printer, produced under an agreement with Tokyo Electric Co., operates at 50 char./sec. and 80 char./sec. or in graphics mode at 144 by 144 dot/in. It is compatible with the IBM Personal Computer XT and AT and costs $350.

The 9500 LQ dot matrix printer has a 10-in. carriage, and the 9515 LQ dot matrix printer has a 15½-in. carriage. The dot matrix printers, aimed at the lower end of C. Itoh's market, print at up to 250 char./sec. with draft quality, 125 char./sec. with memo quality and 28 char./sec. with letter quality. They cost $650.

All of the printers will be available during the first quarter of 1986, according to C. Itoh.

Laser systems announced

From page 41

firm International Data Corp., said that she was not familiar with the Computime product but that it appears they may be breaking a price barrier in the personal computer-based optical storage market. Other vendors' offerings for the personal computer have cost about $24,000 and do not have nearly the capacity that Computime is claiming, she said.

Through software developed by Computime, the Filebank storage system integrates the write-once laser system with all sizes of computers, from micros to mainframes, the vendor said, although its present focus is a turnkey system for the IBM Personal Computer and compatibles. The Filebank system incorporates the 1G-byte Alcatel Thompson Gigadisc 12-in. optical disk.

The maximum configuration possible on any computer is said to be eight Gigabank controllers, each governing eight read/write units for a total of 8G bytes of storage on each controller (using one-sided disks). Double-sided disks that double the capacity are also available.

A turnkey Filebank system includes the write-once disk drive, the software driver, application software, one disk and installation. The unit is targeted to financial institutions and hospitals, initially, the vendor said, for storage of scanned documents storing records rather than medical images such as X-rays.

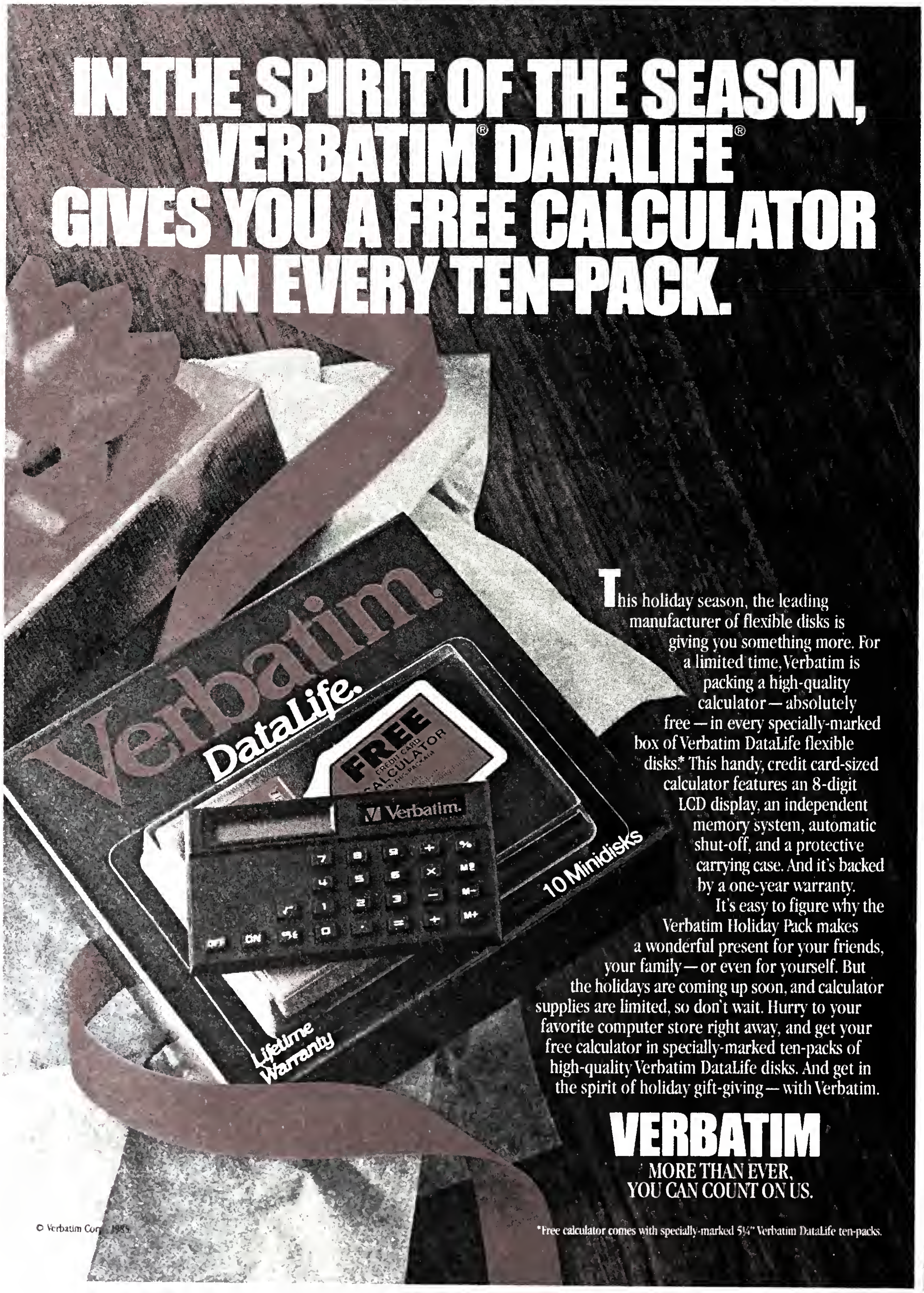
Available for mainframes, minis

Both Filebank and Imagebank, Computime's image processing system, are available now for mainframes and minis, the vendor said. A typical one-controller installation for an IBM 3090-class machine connected via a host adapter would cost about $39,000 for the Filebank and $60,000 for the Imagebank.

A typical Imagebank turnkey system for a personal computer includes Filebank, a scanner, a 1,024 by 1,024 pixel CRT, a host adapter board with a small computer systems interface, software and two single-sided media.

Images are digitized and stored on optical media, then retrieved on the CRT, the printer or both. Up to 20,000 images can be stored on one side of an optical disk, the vendor claimed, and double-sided disks are available. Image widths are limited to 8½-in. at this time.

The systems come either as rack-mounted storage or as stand-alone systems. A 6-ft rack holds up to four units, the vendor said.



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Bits: Fujitsu 780 series

From page 41

ments ranging from 2M bytes to 5M bytes. A 4M-byte block of memory plus the Mapper package costs $85,000. The monthly lease price is $2,065. For those customers who already have Mapper, the 4M-byte expansion costs $36,000 while the lease price is $1,000 per month.

■

Fujitsu Ltd. finally unwrapped the Facom M-780 — its rebuttal to the IBM 3090 — on Nov. 15 in Japan. The machine, Fujitsu said, is 1.7 to 6.7 times more powerful than the company's previous M-380 model.

Fujitsu said the 780 series will be composed of six machines that fall into three groups, based on the number of CPUs. They range from uniprocessors to four-processor units, with the dual-processor model being the equivalent of IBM's high-end 3090 Model 400, the company said.

The M-780's very large-scale integration (VLSI) circuits are mounted on both sides of a multilayered printed-circuit board. Each VLSI chip is said to offer 3,000 to 10,000 gates per chip.

For its M series computers, the No. 1 Japanese computer vendor simultaneously announced an upgraded operating system, the PSIV/F4 MSP. The new operating system reportedly is written in the C language in order to permit an interface between it and AT&T's Unix.

Deliveries of the six versions are slated for sometime between March and September 1987.

Fujitsu's Japanese rivals — NEC Corp. and Hitachi, Ltd. — wasted no time in announcing their own versions of competitors to IBM's 3090. Deliveries of new NEC and Hitachi mainframes are scheduled within the year.

■

Storage Technology Corp., the Louisville, Colo., maker of IBM-compatible peripherals, is singing a cheerier song these days. One veteran executive said plant visits by prospective customers have been steady with at least one per day, and he predicted that the company will be out of Chapter 11 of the Federal Bankruptcy Code court proceedings in 1986.

He also said the plug-compatible industry can learn from Storage Technology's experience with its 8380 Model E dual-capacity disk drive, scheduled for delivery in mid-1986. Most of the product development involved matching IBM's announced specifications rather than waiting eight months to begin reverse engineering when IBM delivered its own 3380 Model E.

■

At another company, Perkin-Elmer Corp., the staff is said to be happy about a recent development, that being the decision to spin off PE's computer products group. The Ocean City, N.J., company's establishment of Concurrent Computer Corp. was based on the belief that nobody thinks of PE — which is heavily involved in developing analytical laboratory equipment, semiconductors, optical equipment and other products — as a computer firm.

Although involvement in test equipment and other products doesn't seem to have hurt a computer maker named Hewlett-Packard Co., there is a logic in what PE says. Concurrent Computer is clearly a name for a computer company, particularly one that is seeking out new DP markets as is PE.

Poduska sets new goals

From page 41

capability. Poduska also said his product will utilize "parallel processing ideas," rather than strict parallel processing technology, and he ruled out use of reduced instruction set computer architecture in favor of application-specific integrated circuitry. But Poduska isn't saying who will help him build his machine.

The speeches at his departure were laudatory. He praised Vanderslice, and Vanderslice noted that Poduska was "going off to do what he does terrifically well" — start a company from scratch. Poduska emphasized that while he is leaving Apollo's board of directors, he isn't selling any of the 1.4 million shares of Apollo stock that he and his family own.

Vanderslice also said that it is anticipated that Apollo will invest in the new company and will establish OEM agreements with Newco.

Vanderslice and Poduska also agreed that Poduska can bring no more than six Apollo employees to his new company in the three-year start-up period. So if Poduska does what he said he hopes to do and builds a success story to match Apollo's, where does that leave Apollo?

Vanderslice has staked out a trail that seems to lead to an integration of the design workstation with the IBM mainframe world and with the power of Alliant-type systems. But that trail toward larger, more powerful workstations also seems to lead to a future decision on whether to go into battle with his own predecessor, Poduska, or forge some type of union between Apollo — the Newco of a few years ago — and Poduska's Newco.

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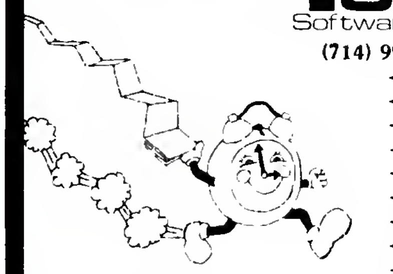

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DG boasts high availability

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592M-byte disk subsets are said to eliminate nonaccess of data during tape backups. When using mirrored disks, if a failure occurs on one disk, an up-to-date, accessible copy of the data will exist on the mirrored disk. Any write that occurs on the primary disk also occurs on its mirror.

Mirrored disks are generally found only in fault-tolerant systems, Serlin said, but they are beginning to appear in others. The clear advantage of disk mirroring, Serlin continued, is that when two tasks require the same data, you can satisfy both tasks at once.

The mirrored-disk capability is said to lead to better performance, according to Doug Richards, DG's product manager for MV systems. In a typical DP environment, there is a preponderance of reads over writes, he said. Performance is improved with mirrored disks because reads go to either disk drive, so two disk heads look for the information, Richards added.

For DG users at Levelor Lorentzen, Inc., a window coverings manufacturer in Rockaway, N.J., the SHARE features did not figure into their decision to place an order for one of the MV/20000s. John Fox, vice-president of administration in the firm, said the decision to purchase was based on the higher million instructions per second (MIPS) rating of the MV/20000 Model 1 — 5.5 MIPS — over that of the MV/10000 — 2.5 MIPS — and the better processing time for the company's large applications. Levelor has three MV/10000 systems in its corporate office and a dozen other MV/10000s at its branches.

Dual porting feature added

Dual porting of the disk drives, another availability feature, allows one disk to be ported to any two Eclipse MV CPUs, each with its own set of users.

The benefit of this, DG's Richards said, is that if System A fails, the drive can be brought up and made active on System B so that the data it contains will be available to users.

Dual porting, available for about 20 years and resident on all large IBM disks, is certainly an important feature for DG to add, Serlin said. If one I/O path failed, for instance, the data on the disk is good — but if you do not have a path to get the data, it is useless, he added.

Other features that make for high availability include double-bit error correction on the machine's 256K-byte random-access memory chips, which enable a memory chip that has developed one hard error to continue correcting soft errors. Serlin pointed out that many medium-scale systems — probably including IBM's 4300 line and Digital Equipment Corp.'s VAX machines — also have the feature.

The two central processors in the dual-processor Model 2 system are not fault tolerant in the sense that they duplicate, or mirror, each other in case one of them goes down. However, if the system crashes, whichever processor is not working can be cut out, while the operating processor continues to run the entire system — a feature Serlin said is available on most dual-processor machines.

Other features include a dedicated Diagnostic Remote Processor that is backed up with its own battery and has its own operating system. The system includes a full battery backup capable of powering the 56-slot CPU chassis — including cooling fans — for a total of two minutes minimum, without ac line voltage present.

DG is also offering a refinement of its AOS/VS operating system in Revision 7 that allows systems programmers or operators to establish classes of users. This feature is said to give guaranteed percentages of CPU time to a particular class.

While this feature is new to DG, it is available on any AT&T Unix machine, Serlin said, and has been part of DEC's VMS operating system "since Day One. It is not a feature that deserves a headline," he stated.

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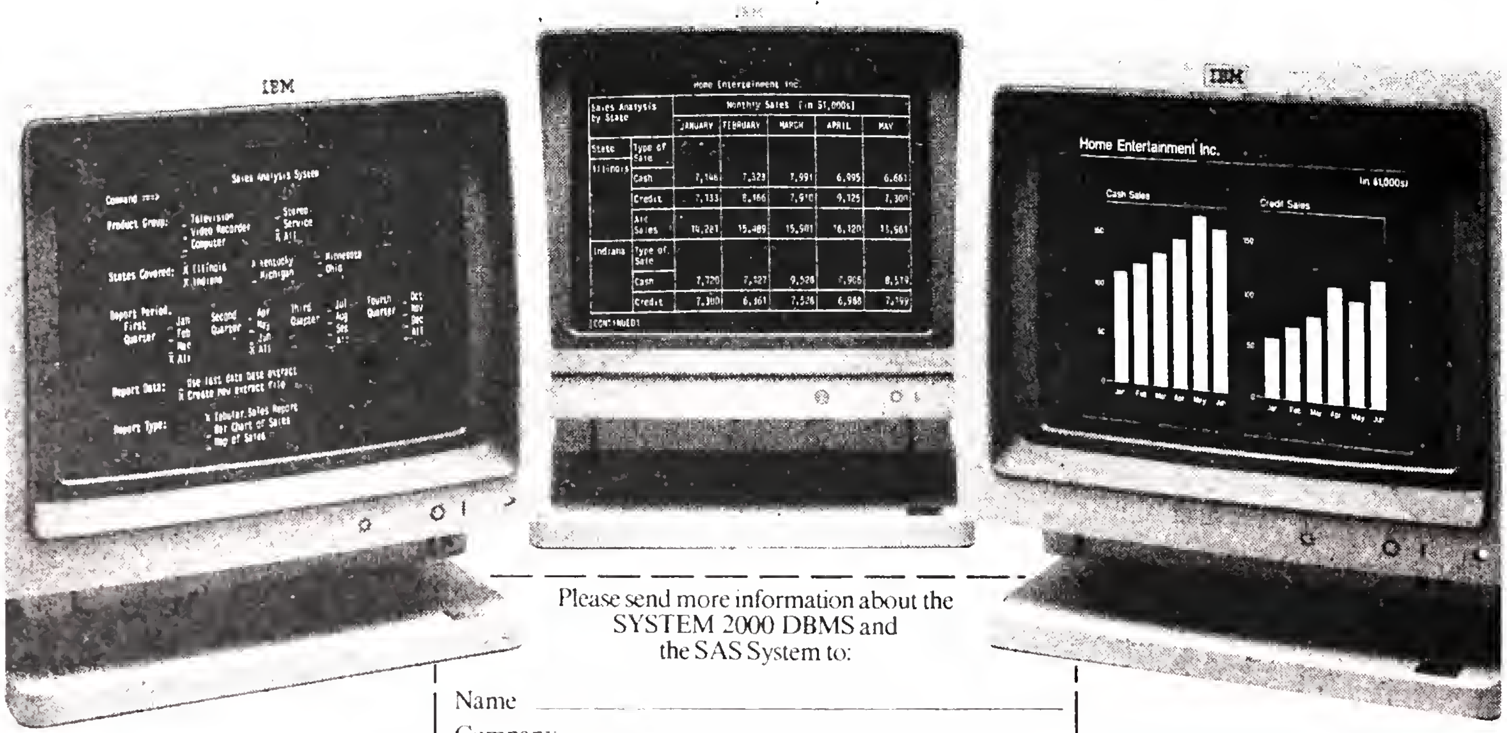

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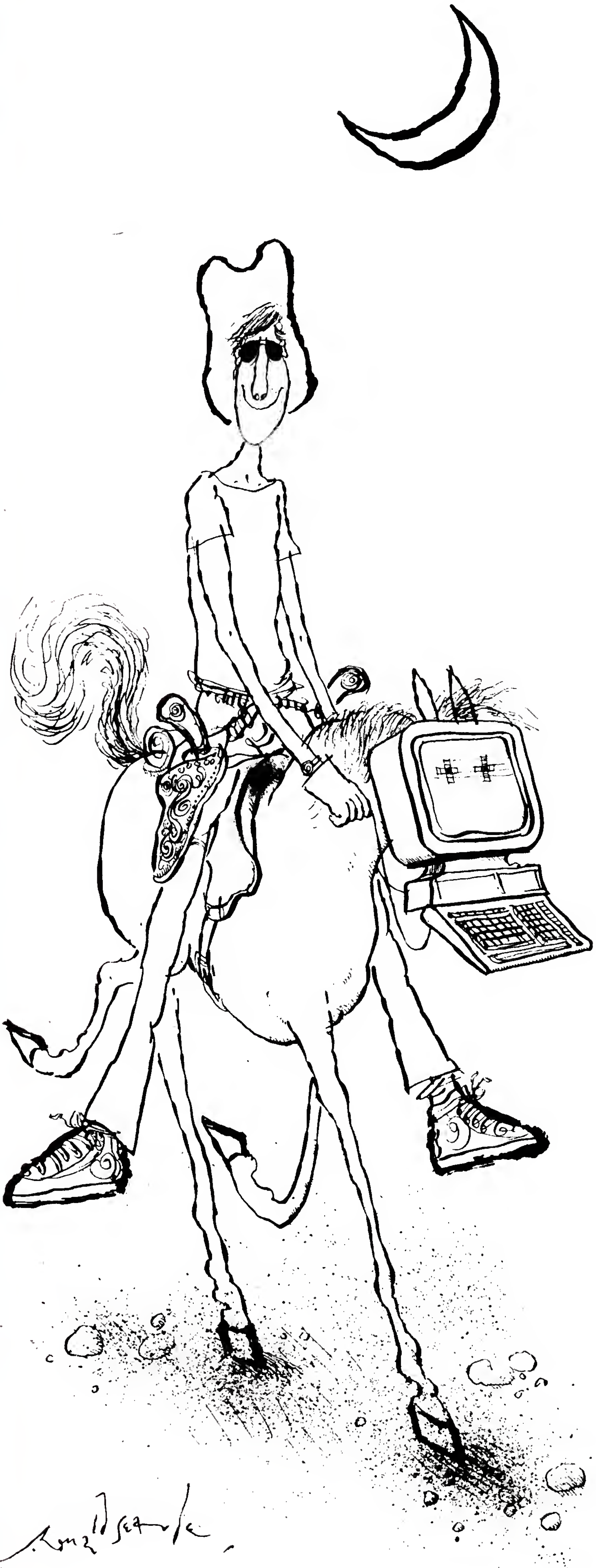

Jesse James at the terminal

An intrigue of security measures, audit trails and time bombs

By William Atkins

Jesse James Wheeler was angry. Seething. How could they pass him over for promotion again? Jesse was sure that the company would long ago have recognized and rewarded his ingenuity. But it hadn't, and he was mad. If they weren't going to give him what he deserved, he'd take it himself.

If one could trust appearances, Jesse was the very model of a modern systems analyst. At 29, he had put in six years with Technee Corp. He came in early and stayed late. He even took his personal computer home so he could work nights and weekends.

He had learned the company's computer system quickly, and just as quickly he had devised ways to bypass the controls and make it work better.

Though Jesse fit the picture of the up-and-coming computer professional, he also prided himself on his connections to his dashing and courageous predecessor, the intrepid robber of banks and trains. He bore the legendary name, of course — although his name, Jesse James Wheeler, came from his two grandfathers, so the conjunction happened entirely by chance.

But he also possessed James' cleverness. And his knowledge of Technee's computer system would bring him more money than a loaded pistol ever could.

The plan

Jesse's daring namesake had always sought to justify his banditry on grounds of persecution. Moreover, the original James gang used to brag that it had never robbed a friend, a preacher, a Southerner or a widow. Jesse decided that he would be just as considerate. He would not steal from anyone but the faceless corporation.

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He decided to set up a fictitious vendor-payable account in the computer and then transfer payments directly to his bank account.

Maxim: When information systems are involved, beware of disgruntled employees.

Like many large companies, Technee maintained extensive DP operations, with centralized and distributed computer systems as well as a flock of microcomputers wired into both. Management understood the value of its electronic treasure trove and had taken steps to protect it.

Special access-control software allowed terminal users — identified by user codes and passwords — to access only those records for which the users were authorized and to perform only specific, authorized functions such as reading files or adding or deleting information.

The software was also used to limit the amount of information available to each authorized user; restrict the central computer to private, secured phone lines; and allow end users access only to certain terminals. Perhaps most important, the software kept records of who accessed what, from which terminal and when.

Jesse had known that the specialized audit software existed, but its secrets were closely guarded by the auditors themselves. The software caused his biggest worry: Since he didn't know where the system's traps lay, he couldn't be certain of avoiding them. He decided to minimize the risk of being caught by leaving a little "present" during the robbery — a special program that would cover his tracks by eliminating any record of the transactions.

While working on his microcomputer, Jesse had noticed an inordinately long wait after he signed on with his user code and password before the central computer responded that he was logged on and could proceed. He decided to ask his supervisor about this.

"Not to worry," Matt said, "it's just security. The system cuts you off. It drops the line, so to speak, and dials you back. Or, I should say, it dials back the phone number you should be using. That's how it knows every terminal tapping into it is right where it ought to be."

Matt also told Jesse that every supervisor had a frequently changed password that allowed access to the "secured" systems. He had designed many of these features himself and was justly proud of them.

Maxim: All employees must be sensitized to security issues.

Technee's security managers did all they and the corporate insurance company deemed necessary. They knew about even more sophisticated and exotic access-control devices — gadgets that scanned potential users' fingerprints, voiceprints, even the blood vessels in the retinas — but these came at a price Technee wasn't willing to pay.

Jesse needed a password that would give him access to supervisory functions because to divert funds to a fictitious account, he first had to be able to create that account.

He needed a partner, and he found Frank — a computer operator with a bit of a gambling problem. Nothing serious, he told Jesse, just a few hundred dollars each week. Frank had no love for Technee either. But he did have a way of getting the master password list.

Maxim: Investigate your computer personnel before hiring, and be alert to evidence of such personal problems as compulsive gambling and alcoholism.

Frank used to work at Technee's world headquarters; in fact, somewhat against his wishes, he'd been transferred to Jesse's Eastern Region office in Newark, N.J., only a few weeks before. So nobody thought much about it when Frank showed up at Technee's world headquarters' complex in Stamford, Conn.

The sensitive nature of Technee's business necessitated its state-of-the-art physical security system. Both inside and outside the modern structure, surveillance cameras silently scanned every movement, day and night.

Frank knew the cameras picked him up the minute he pulled into the employee lot. But it didn't matter. His parking pass was still affixed to his windshield, and the identification badge hanging from his lapel cleared him to enter both the building and the computer installation.

Maxim: Keep all personnel records and privileges up to date.

"Hi, Frank," Butch said, smiling from ear to ear. Butch was Technee's oldest security guard. Even though he knew Frank had been transferred, he didn't bother to check whether he should be there. After all, he'd known him for years.

To get the password list, Frank needed to enter the computer installation. He could do that the same way he always had — by punching a four-digit code into a keypad on the door panel. True, they had changed the code since he left, but getting the new code wouldn't be that difficult.

Frank simply wandered into the programming section. "Hey!" he yelled at no one in particular. "What's the code this week?"

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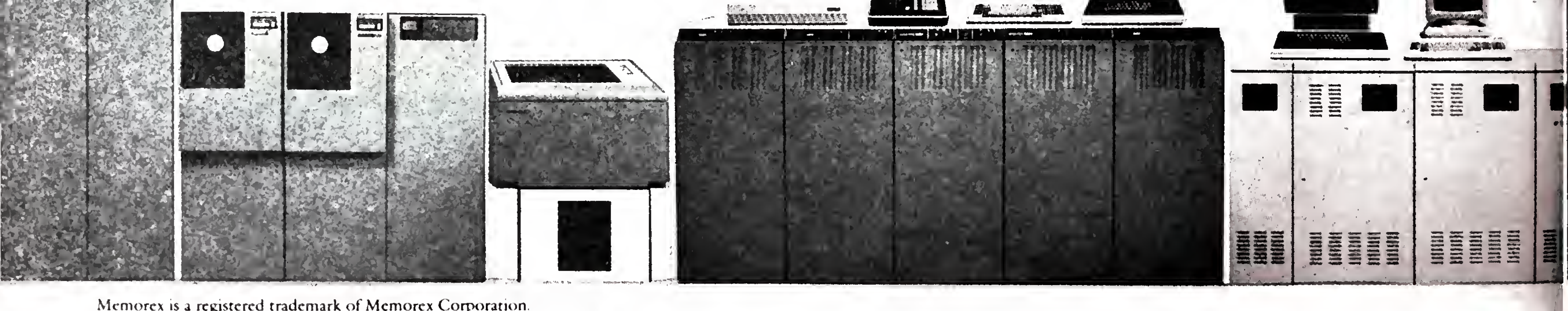

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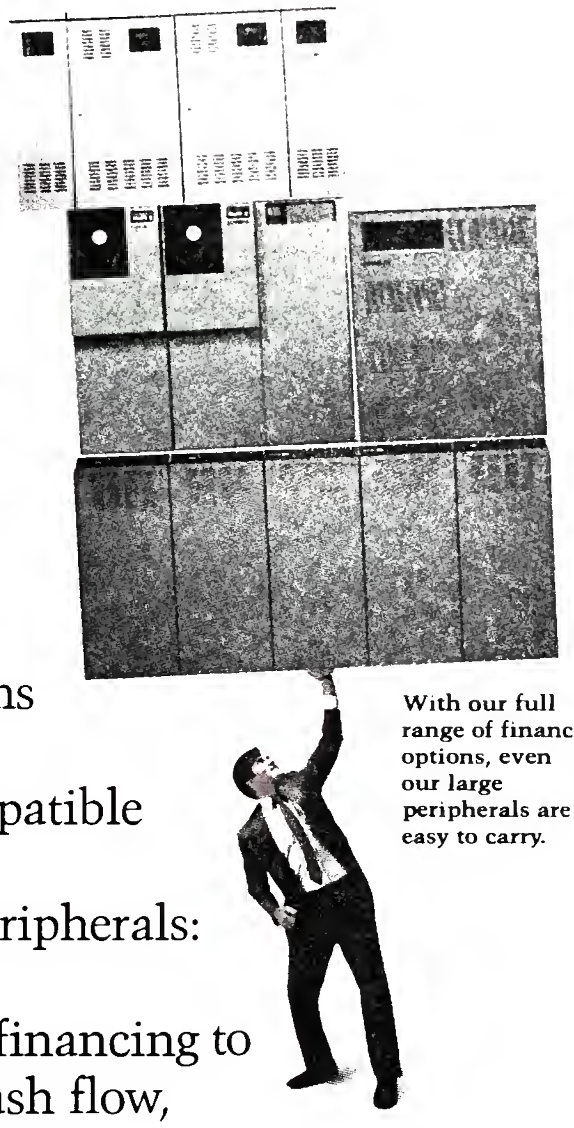

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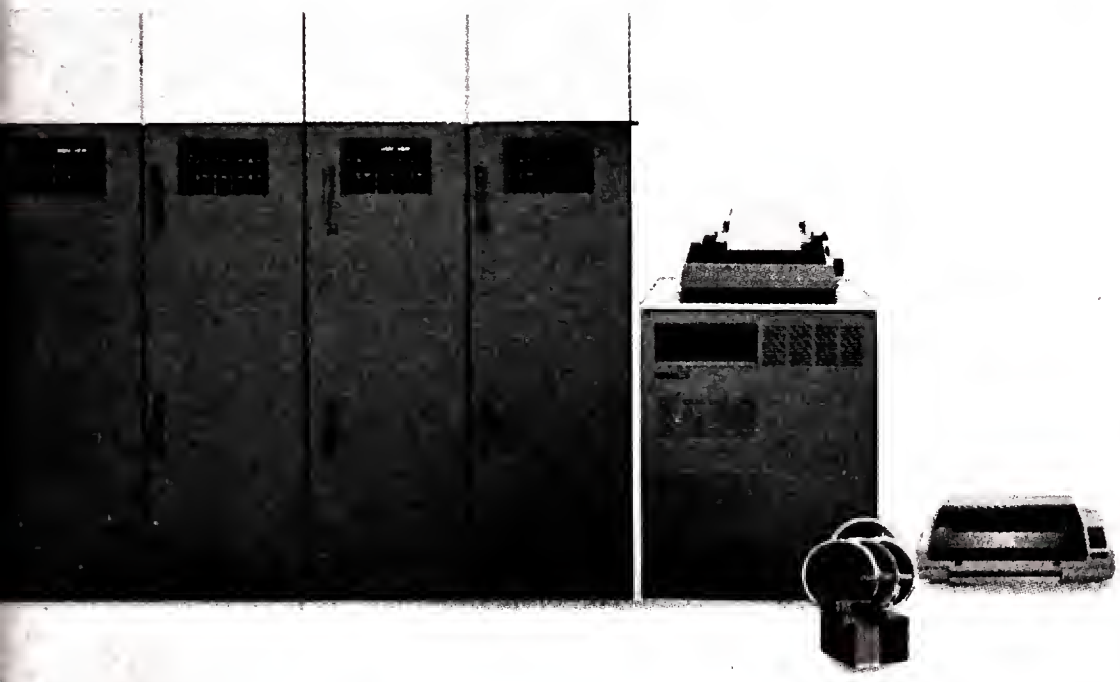

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"It's 313," was the reply from a neighboring cubicle. Like all Technee codes, this was simply a telephone area code. Following standard procedure, Frank prefixed a "1," punched 313 and entered the installation.

The main computer was, as befitted its delicate controls, enclosed in a scrubbed-clean room to the right, sealed off from the printers with their dust, confetti and vibrations. Frank turned left into the print room and, after a few minutes of rifling through the output reports that awaited pickup, found what he wanted — the list of supervisor password codes and the special terminal passwords.

"I've got the passwords," thought Frank in silent triumph. "But I couldn't have done it if those people hadn't helped me. In the end, people are what's important."

Maxim: Keep all security codes strictly secret.

During his six years with Technee, Jesse had learned about many of the operation's complete security features. Quite early on, he had noticed that, whereas each vendor account number had only six digits, the order entry group keyed seven numbers into the system.

He knew that the seventh digit was a check digit — part of the security system — and that to create a new account, he would have to devise a correct check digit of his own.

Since he knew many of the accounts' full numbers, Jesse could use his own computer and a simple program to arrive at the numerical process that unlocked all the account numbers. Having the check digit process and the passwords, he would be able to construct new account numbers that the system would readily accept.

Jesse's first assault on Technee's computer system was a failure. The kind of failure, in fact, that would have bloodied, if not killed, his train-robbing namesake.

As he had often done before, Jesse brought home his personal computer. Remembering what Matt had told him about the callback security feature, he first took the precaution of forwarding his office phone calls automatically to his home phone.

"No control device exists," he thought smugly, "that can tell when a call is being forwarded." Using the password list Frank had given him, he logged on and entered Matt's supervisor code.

He headed straight for the program for creating new accounts — and directly into a very expensive, very subtle and very clever trap. For although the system seemed to be following his instructions obediently, in reality it was doing nothing he asked and was all the while recording his every move.

Jesse had been snared by a state-of-the-art software auditing package that gave him access to a set of false files and freedom to do as he wanted.

To give due credit to his thespian talents, it must be noted that Jesse showed no trace of panic when the chief security officer from Technee's world headquarters called him into Matt's office the next afternoon. There on the desk was the evidence — a printout declaring:

```
OPERATOR IDENTIFIED AS
SUPERVISOR 31688
ON INVALID SUPERVISOR
TERMINAL 5479,
TELEPHONE NUMBER 555-2564,
ACCESSED THIS PROGRAM
FROM 1954:50 TO 2003:25,
6.19.85.
```

Matt, of course, denied using Jesse's terminal — as did Jesse himself. The building guards could not say for sure that Jesse had taken a terminal home the previous night. He was off the hook; there was no way they could prove he — and not someone else — had used his terminal.

The experience, though almost fatal, proved immensely valuable to Jesse, for now he possessed a piece of vital knowledge — namely, that there was another level of security to be breached. The company had installed a security system on the terminals themselves, so that not all terminals could do all things.

Jesse needed a supervisor's terminal. And he needed it on a Thursday so that Friday morning the accounts payable program would make a payment to his fictional account.

Maxim: Sophisticated security software systems are only as reliable as the people who guard them.

Another long day at the office. Time to scoop up the micro and lug it off to do some homework. At the employee exit, Danny, the security guard, was just getting ready for a restful evening.

"Hey, Danny!" Jesse called out. "My computer's on the fritz and I've got a boatload of work tonight. How's about letting me into Matt's office so I can use his? He said I could use it anytime."

Danny had never paid much attention to those typewriter-TV screen things; if you'd seen one, you'd seen 'em all. Jesse, of course, knew better. He needed Matt's five-star Supervisor I with circuit boards that would make that audit software program roll out the red carpet.

While picking up the machine, he set the callforward to his home phone. With unusual good cheer, he wished Danny a good evening. He himself intended to have one.

It is 11:30 p.m. Jesse is seated comfortably in his bedroom. His elaborate preparations are behind

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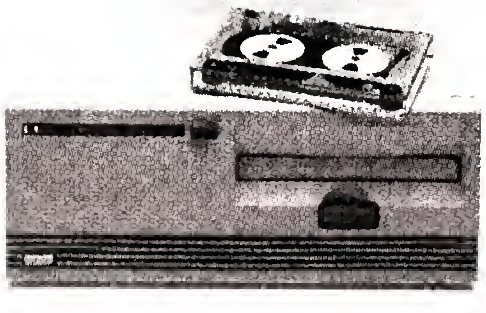

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him. It had all come down to this:
the silent predator with his elemental weapons —
Jesse James with a terminal and a modem.

The crime

It had all been rather simple. Using everything he had learned at Technee, Jesse tapped into its central computer and created an account in his name. He had noted carefully all the necessary numbers: account, check digit, vendor, bank, American Bankers Association transit and bank account.

Carefully, he read from his notes. By simply inputting the appropriate purchase order and balances, he initiated next-cycle payment transactions totaling $2 million. He then applied a finishing touch of criminal acumen: a little time-bomb program that would remove all evidence.

Jesse didn't sleep a wink that night. He alternated between imagining how he would spend such an enormous amount of money — villas, yachts, wining and dining, gambling — and gloating over how he had beaten the billion-dollar Technee with all its policies, procedures and precautions.

In the morning, Jesse panicked. The long night had taken its toll. When the alarm had sounded he had turned it off automatically and fallen asleep. Now it was 7:15 a.m. He got dressed quickly, grabbed the computer, and dashed for his car. Usually at work no later than 7 a.m., Jesse knew that Matt came in about 8 a.m.

Practically knocking someone over, he rushed breathless up to Bob at the guard desk.

"Is Matt in yet?" he asked. Jesse's mind was racing as he tried to figure out what he could say if Matt was already there. The monitoring system would show that there was no problem with Jesse's terminal. How would he be able to explain taking Matt's?

"Haven't seen him," replied Bob. The answer seemed to take an eternity to sink in. He just stood there. "Thank goodness," he said finally. He didn't even notice the stares Bob and the other person gave him.

Jesse, explaining to Bob that he had used Matt's computer because his was broken, got him to unlock Matt's door. He set the machine down on the desk, connected it to the electrical outlet, plugged in the telephone jack and canceled the call-forwarding instruction. "What presence of mind!" he congratulated himself. "Switzerland, here I come."

> ”
>
> *It had all been simple. Using everything he had learned at Technee, Jesse created an account in his name.*

The witness

Jane Clades, a waitress in Technee's executive dining room, hadn't missed a day since the doors opened at this branch just over nine years ago. She was proud to be part of Technee and its success; she felt she belonged.

She read the monthly employee bulletin regularly and had been interested recently in the article titled "Security: Everyone's Responsibility." She liked the fact that Technee believed its first line of security rested in its employees. The article emphasized a family image: everyone pulling together and all keeping alert.

Jane also liked the friendly chief security officer from world headquarters who wrote the article; he'd visit at least once every few months and always stopped in the restaurant for a cup of coffee.

Jane didn't like Jesse's bumping into her that morning without one word of apology. He hadn't hurt her, but his bad manners annoyed her. She also kept thinking about how nervous he looked when he asked the guard to let him into a supervisor's office. Why did he need to get into that office in such a hurry? Why couldn't he just wait?

Jane told the short-order chef what had happened. The more they talked, the more she thought Jesse had behaved suspiciously, and the more the chef encouraged her to do something about her suspicions.

Telling herself she had nothing to lose and encouraging herself with the article she had read, Jane called Technee's chief security officer and told him her story.

The capture

Even with considerable assistance, security personnel took more than 36 hours of work around the clock to uncover enough evidence to indicate embezzlement. (If Jesse hadn't applied his time-bomb program, they could have reconstructed events in a few hours.) Because they had no way to prove the crime, the rest was up to the chief security officer.

Waiting for his taxi to the airport, Jesse looked over his luggage. It seemed everything was in order. In just 90 minutes, he would be on the plane; in a few hours, he would be skiing and beginning to enjoy the $2 million.

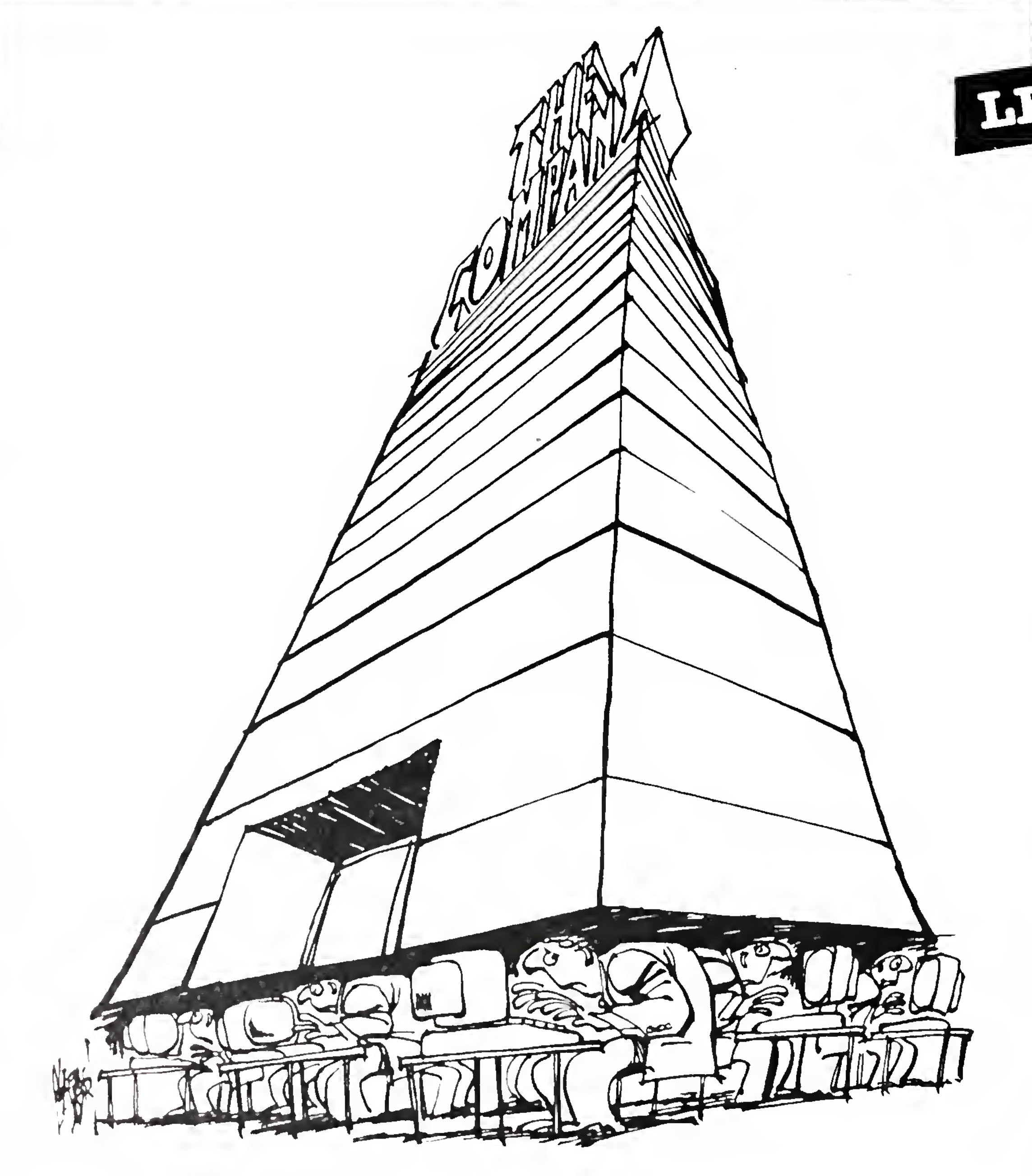
He heard the door bell and, with a smile of anticipation, picked up his skis, boots and suitcase and opened the door. Jesse's face turned white, his mouth went dry and his legs began to shake.

The last person he expected to see on his doorstep at high noon on a Sunday was the chief security officer of Technee. "Do you know how you're going to spend it all yet?" asked the officer.

Jesse couldn't believe he had made a mistake. He had to know where he had gone wrong. "I don't understand," he blurted out. "How did you work it out?"

The officer's bluff had worked.

And Frank had been right. In the final analysis, people make the difference.



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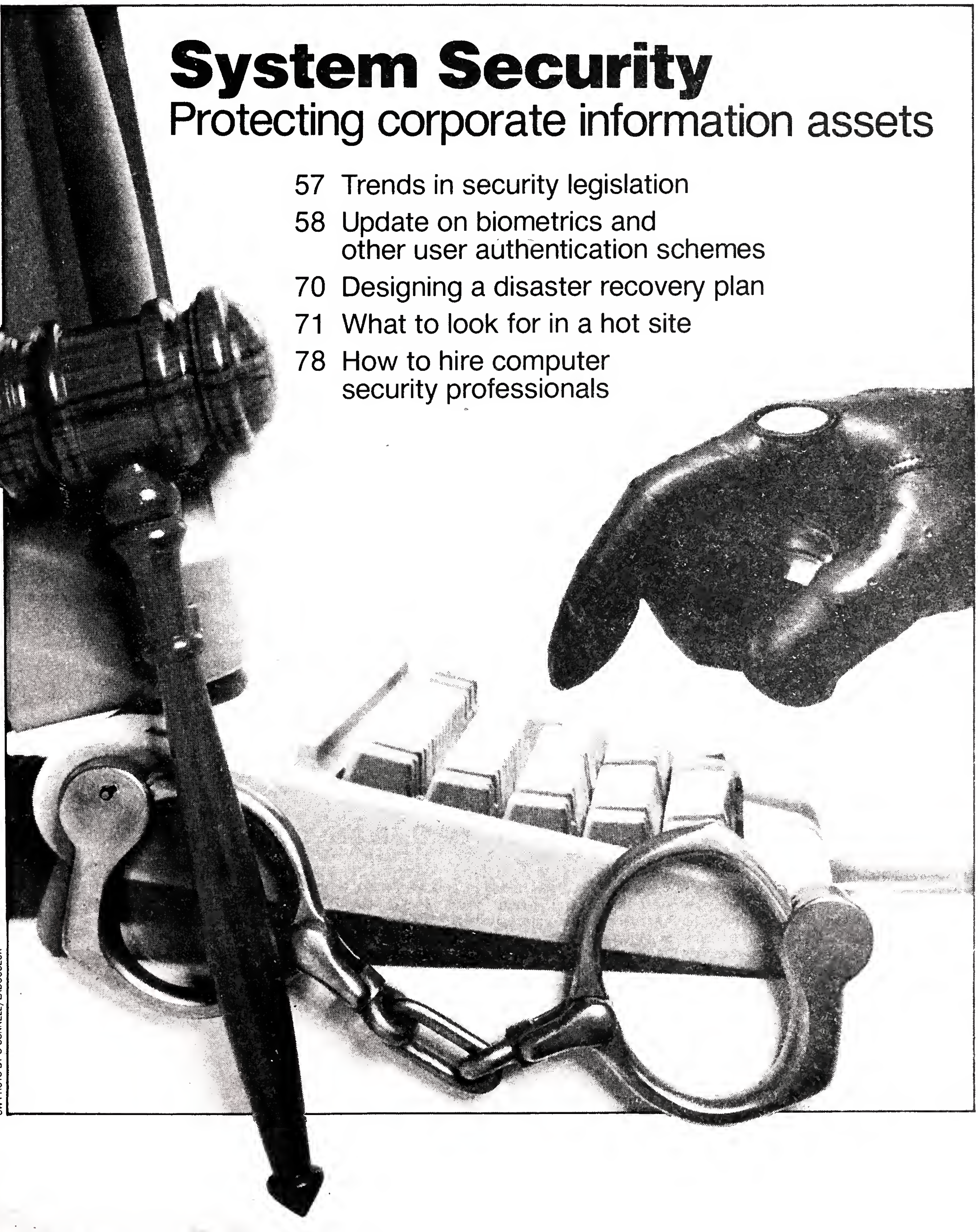

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A credit union that survived the hassles of recovering from a disaster without a plan to guide it cautions other shops to be prepared/**66**

A detailed, 12-step recovery plan ensures that an organization will survive most physical disasters or intentional acts of destruction/**70**

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MIS managers can institute access control measures for microcomputers that link into existing system networks if they follow some basic guidelines/**72**

Off-the-shelf audit software tools promote tight security because they allow auditors to work independently of the DP staff/**74**

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Cracking down on computer crime

Congress grapples with political, legal issues in effort to draft bills

By Mitch Betts

If a business competitor gets unauthorized access to your sensitive electronic mail messages, is that an invasion of privacy or criminal trespass and burglary, or both?

That is one of the many legal questions the U.S. Congress is wrestling with as it tries to develop computer crime legislation covering computers used in interstate commerce. Congressional leaders hope to pass such a computer crime bill — perhaps as soon as early 1986 — but several legal and political issues must first be resolved.

In the U.S. House of Representatives, which has taken the lead on this issue in the federal arena, there are two computer crime bills getting very active consideration in different subcommittees of the House Judiciary Committee. One has its philosophical roots in the privacy category, the other in the crime category. They also overlap.

The Electronic Communications Privacy Act of 1985 (H.R. 3378) is sponsored by Rep. Robert W. Kastenmeier (D-Wis.), who is chairman of the Subcommittee on Courts, Civil Liberties and the Administration of Justice. The bill has been referred to his subcommittee and already has strong support from the American Civil Liberties Union and the Electronic Mail Association.

This privacy-oriented bill was designed to outlaw the interception of electronic mail and data communications, thus giving electronic communications the same legal protection that the 1968 federal wiretap law gives to ordinary telephone conversations. The bill also outlaws the interception of electronic communications while they are stored in the computer.

"It would be inconsistent to prohibit the interception of digitized information while in transit and leave unprotected the . . . information while it is being stored," Kastenmeier explained. "This part of the bill assures consistency in this regard."

Philip M. Walker, counsel for GTE Telenet, Inc. and spokesman for the Electronic Mail Association, said the provision covering messages while stored in the computer is crucial "since the most likely method of privacy invasion comes when the perpetrator attempts to enter the electronic mailbox of a system user."

That provision also expands the bill from a communications privacy bill to a computer crime bill, thus creating the overlap with the second major House bill, sponsored by Rep. William J. Hughes (D-N.J.).

Hughes, the chairman of the House Subcommittee on Crime, has long sought a computer crime bill covering the private sector. Last year, he pushed a crime bill that outlawed unauthorized access to both private sector and government-related computers, but only the provisions on government-related computers became law, the Computer Fraud and Abuse Act of 1984 (Public Law 98-473).

Still pursuing the issue, Hughes this year introduced the provisions covering the private sector — the ones that failed to pass last year due to Senate objections — as a new bill (H.R. 1001).

The approach of the 1984 law and the latest Hughes bill is that unauthorized access to computer systems amounts to a criminal trespass and perhaps criminal fraud.

As Hughes explained his bill, it would establish a federal felony for unauthorized access to computers if the defendant, in carrying out a scheme to defraud, gets $5,000 in illegal gains in one year. The bill also creates a misdemeanor offense when there is not a scheme to defraud, if the financial loss adds up to $5,000 in one year.

"It is aimed at white-collar criminals and hackers who would violate our privacy and carry out high-technology schemes to defraud," Hughes said earlier this year.

So far, the Kastenmeier and Hughes bills are moving in separate and somewhat competing tracks in the House Judiciary Committee, but ultimately they may have to be merged.

"I think they can proceed separately, independently, and then later in the process, they could easily be joined" for passage by the House Judiciary Committee and then the full House of Representatives, commented P. Michael Nugent, who is Washington, D.C., counsel for Electronic Data Systems Corp. of Dallas.

Meanwhile, the Senate Judiciary Committee has a remarkably similar situation. Sen. Patrick J. Leahy (D-Vt.) has introduced the Senate version of the Electronic Communications Privacy Act of 1985 (S. 1667), and Sen. Paul Laxalt (R-Nev.), chairman of the Subcommittee on Criminal Law, recently held a hearing on the subject of computer crime.

Further complicating the legislative scene is a proposal drafted by the U.S. Department of Justice, the Federal Computer Systems Protection Act of 1985, which would make it a federal felony to engage in computer fraud or theft or to damage computer hardware or data when the offense involves computers used by the government or businesses engaged in interstate or foreign commerce.

Congressional leaders would like to arrange a compromise so that any final bill will have the support of the Justice Department, which will enforce the law, congressional aides said.

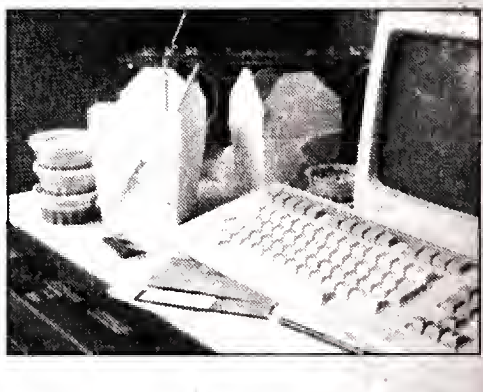
According to congressional testimony and interviews with computer crime experts, the legislative negotiations will require the resolution of several outstanding issues:

- At what point should the federal government assert jurisdiction? Should the "trigger" for federal jurisdiction be a large financial loss, such as in the Hughes bill or the fact that the computers are located in different states?
- Will the federal law trample on state laws and prosecutors? Should the jurisdictional dividing line be stated in the statute or left to federal-state negotiations?
- Will the legislation be an adequate deterrent to hackers? The Justice Department says the law should let federal authorities seize the hacker's computer equipment.
- Should the privacy of data communications be protected even if the parties do not take any steps, such as encryption, to protect the communications? Should the Electronic Communications Privacy Act cover forms of communications that are meant to be public or that have no expectation of privacy?

See **CRIME** page 65

Betts is a correspondent in Computerworld*'s Washington, D.C., bureau.*

Portrait of a hacker



GAITHERSBURG, Md. — Tracking a hacker? Look for a boy who eats junk food or Chinese food from 24-hour restaurants.

That is one of the characteristics described by Julie A. Smith, an analyst for the government's National Computer Security Center, at the recent National Computer Security Conference.

Because it is easiest to work on computers undetected during the wee hours of the night, and because many hackers are in school during the day, Smith explained, a hacker's meals tend to be take-out junk food eaten at the computer terminal or food eaten at 24-hour restaurants. "In fact, Chinese food tends to be a favorite among college hackers," Smith said.

This was just one of the characteristics Smith reported in a research paper that provides a psychological profile of the hacker. She said the late hours and self-imposed confinement to computer rooms tend to reinforce the "environmental isolation" of most

See **HACKER** page 65

Computer crime victims have recourse to novel legal remedies

Civil suits, restitution, injunctions possible

By Jay BloomBecker
Special to CW‡

With each new story of hacking, the inescapable truth becomes clearer. Democracy has come to computer crime. Millions of teenagers now have the opportunity, the means, the motivation and the information necessary to pester, if not cripple the business computer user community.

Fortunately, democracy works both ways. As the number of potential criminals has grown, so have the defenses available to the business user community. All but four states now have computer crime laws, with West Virginia, Vermont, Arkansas and Indiana as the only holdouts. With these laws, prosecutors are no longer handcuffed when attempting to prosecute cases brought to their attention.

Perhaps the most important feature of the new computer crime laws, one largely overlooked by the professional press, is the variety of new remedies offered the victim of computer crime. It is no longer necessary to wait for the prosecutor to act to punish an alleged computer criminal. A number of novel civil remedies have been written into law, each offering alternatives that the business user should carefully consider in the appropriate case.

Civil suits. Even without special legislation, victims of computer crime are often entitled to sue the perpetrator under common law. Stealing a businesses' property or doing damage to it are torts for which the victim can recover damages. In some cases, however, the damages may be difficult to estimate if the property is intangible, such as computer time, software or data.

Added to these traditional remedies, there are now new "causes of action" (the legal phrase meaning bases for a lawsuit) that allow suits when someone has been victimized by a computer crime.

Some of the new causes of action are particularly appealing to the victim of a computer crime because they allow for recovery of far greater damages than traditional law would provide.

Connecticut, for example, allows for damage suits alleging computer crime. Where there is proof of "willful and malicious conduct" by the defendant, the victim may be awarded treble damages. Similar to private antitrust suits, this provision is likely to increase the motivation of computer crime victims to bring suit.

California and Virginia also provide for civil suits arising out of computer crime charges, though neither provides for treble damages. California addresses two practical problems of civil suits. It allows suits against the parents of minors who are alleged to have committed computer crimes. This provision should provide some added incentive to businesses victimized by teenage computer enthusiasts.

The California law also defines injury to include "any expenditure reasonably and necessarily incurred by the owner or lessee to verify that a computer system, computer network, computer program, or data was not altered, deleted, damaged or destroyed" by any illegal access of the computer system. The cost of this sort of verification could easily exceed any other item of damages.

Injunctions. Connecticut, New Jersey and Delaware provide that a business believing itself to be the victim of a computer crime can apply to a court for injunctive relief to stop the crime immediately. The same application can ask for the appointment of a receiver to take control of the property of the party alleged to be committing the computer crime.

This is, of course, an extreme remedy not likely to be granted except in extreme cases. It can be important where there is an ongoing dispute, for instance concerning the ownership of software and immediate resolution of the property rights involved is desirable to all concerned.

Restitution hearings. A third important remedy available to victims of computer crime is a cross between civil and criminal litigation. After a computer criminal has been found guilty or has entered a guilty plea, a court in Connecticut or Delaware may award the victim up to twice the defendant's "gain" from commit-

See **VICTIM** page 65

BloomBecker is the director of the National Center for Computer Crime Data, a research institute based in Los Angeles, Calif., that produces publications and seminars on the topics of computer crime, computer security and computer ethics.

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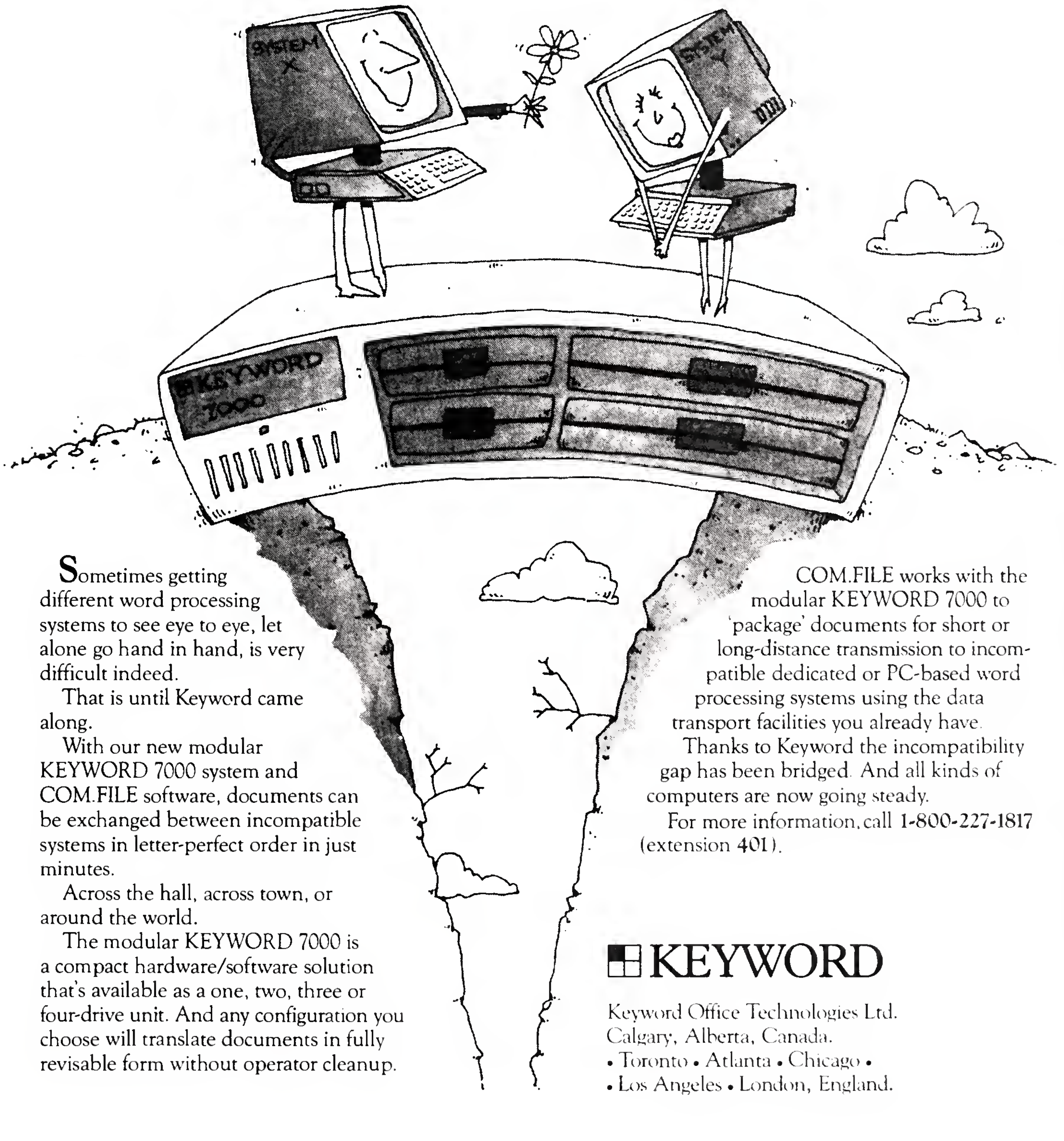

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Futuristic authentication schemes overcome passwords' limitations

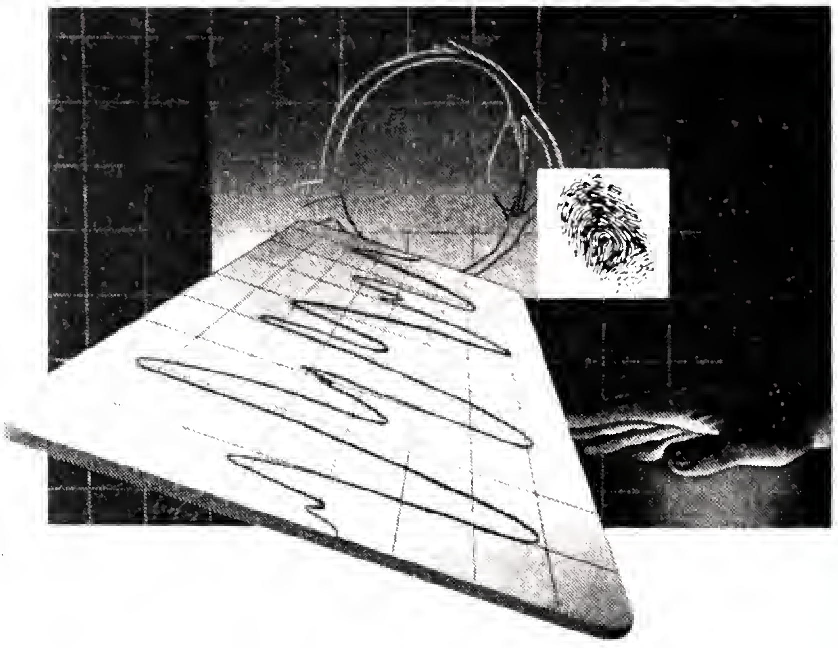
ILLUSTRATION BY BRUCE GILFOY

By Stephan Seidman
Special to CW

Passwords cannot, in themselves, ensure the security of a computer and its files, mainly because they give no indication of who is trying to gain access. But new authentication schemes that have their roots in the concept of password control can overcome this fault.

Certainly, passwords are not useless: They at least provide an incremental improvement over totally uncontrolled access. But people are careless with them — and always will be.

Users write their passwords on bits of paper near their workstations or scrawl them on pieces of tape attached to the workstations themselves. In such cases, the security administrator's inability to know who is entering the password opens a major loophole.

Even when users handle their passwords with care, administrative carelessness can lead to breaches in security. Most passwords are rarely changed. A potential perpetrator of computer crime can acquire a legitimate password by casually looking over the shoulder of an authorized user and can use the password later, when the authorized holder is away from his terminal.

In recent months, vendors have introduced products that overcome the problem of fixed passwords. These products, hand-held devices that generate randomly selected and encrypted codes, are based on constantly changing passwords that are never repeated.

After an authorized user logs on to his workstation with an initial, fixed password, he obtains a generated password from the device and enters this code into his workstation. Code entry is accomplished by one of three means, depending on the type of generating device the user has:

- Most devices require the password to be entered at the workstation keyboard. Enigma Logic, Inc.; Security Dynamics, Inc.; and Sytek, Inc. supply such devices.
- Other devices need to be plugged into a reader that is attached to the user's workstation. These are provided by Analytics Communications Systems, Inc.; Codercard, Inc.; Datakey, Inc.; and Digital Pathways, Inc.
- A third type of device, manufactured by Gordian Systems, Inc., is optically connected to the system. The user enters the generated password by holding the device up to the display screen of his workstation.

All of these offer one great improvement over use of the traditional, fixed password: They defeat hackers' attempts to breach systems by initiating computer-controlled searches for legitimate passwords. A hacker's chance of hitting a randomly generated password are nil.

But these password-generating devices have a shortcoming as well. Many users write their initial-access passwords on their hand-held devices.

Anyone who acquires a lost or stolen device can use it as well as the authorized owner can, and anyone clever enough to steal a device can easily commit a security breach. Such theft is not terribly difficult because authorized users often leave their devices plugged into terminals, lying on desk tops or sitting in unlocked desk drawers.

Security administrators need to know who is holding the device and who is attempting to gain access to the system. To find the answer, they require some implementation of the newly revitalized technology of biometrics.

Biometric devices allow or deny access by comparing a stored record of a personal characteristic unique to a device's authorized user with the actual characteristic of the user who is attempting

See **FUTURISTIC** page 67

Seidman is managing editor of "Smart Card Reports," a series of market-sector reports published by Smart Card Reports, a division of the Palo Alto Managment Group, which is based in Mountain View, Calif.

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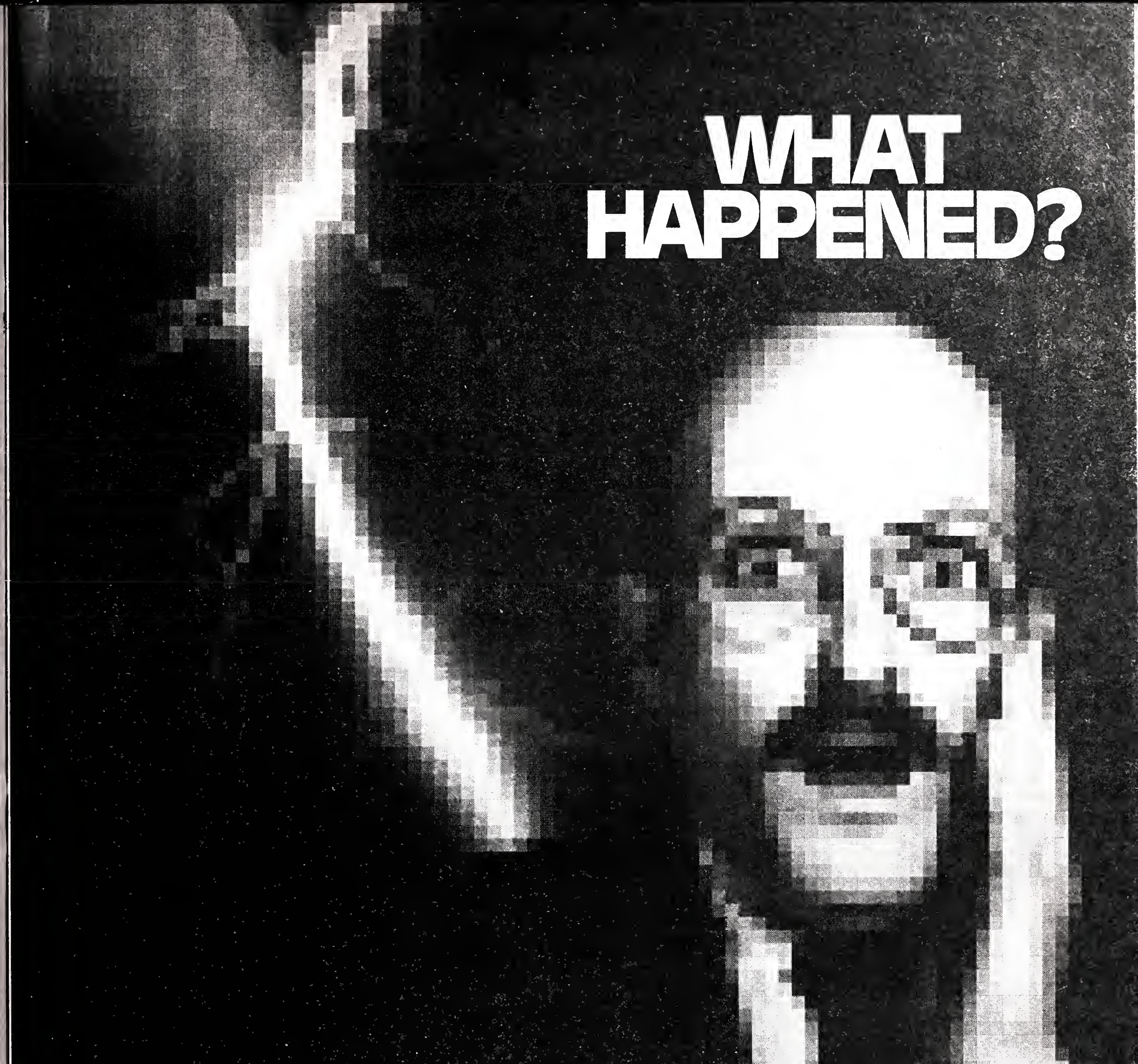

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Trends in computer security: An interview with Jack Bologna

Security has been a professional concern of consultant and author Jack Bologna for the past 30 years.

During that time, he spent 14 years in federal investigative agencies, including the Internal Revenue Service criminal investigation division and the Drug Enforcement Administration.

Now, as president of Plymouth, Mich.-based Computer Protection Systems, Inc., Bologna focuses his work on corporate computer fraud auditing, computer crime investigation, disaster recovery planning, loss prevention programs and security awareness training. His company publishes the "Computer Security Digest" and "Forensic Accounting Reviews."

In addition, he is a full-time professor of management at Siena Heights College in Adrian, Mich.

During a recent interview with Computerworld *Special Report Editor Janet Fiderio, Bologna discussed computer security issues and current computer security legislation.*

Do you think that recent legislative proposals now moving through Congress to curb hacking will be an effective deterrent to hackers and other computer criminals?

They are a step in the right direction. Whether they are going to function as a long-term deterrent is something I still have reservations and doubts about.

I think the reason why hackers seem to exist is because they fundamentally don't understand the value of the information they are accessing and how sensitive some of it is.

Being able to dial into a credit data base may sound like a lot of fun if you are 14 or 15 years old. Once, however, you realize that they are exposing millions of people to invasions of privacy in the process of doing something which sounds simple and prankish, then the characterization of that particular act changes.

It is going to have a major social impact.

'If research and development is not protected down at the worker level, it will not amount to a hill of beans.'

Do you think our judicial system is prepared to process cases that involve computer crimes?

The judicial system in the U.S. today, which includes the whole criminal justice system, police, prosecuting authorities and judges, is not adequately trained to either appreciate or prosecute computer-related crimes. I am not being supercritical by telling you that; I think that the computer explosion in the last 10 or 15 years has caught these people off guard, and they really don't seem to understand what is involved.

As a consequence, we see a lot of strange things happening. There are far more prosecutions of hackers, for example, teenagers, than there are of sophisticated systems progammers who have found ways to get away with millions. The major losses, in terms of dollars not of privacy, are not necessarily understood or prosecuted [by our legal system]. One of the problems here is that the firms that have been victimized are often reluctant to go forward and complain because of the possible embarrassment and the publicity that might result.

Even if the publicity is very factual, it makes management look slightly derelict in the minds of stockholders and the general public. To look derelict to the public is bad enough, but if the stockholders think management was derelict in exercising its responsibilities, they are going to turn around and start a stockholders class-action suit against them for mismanagement.

Then an organization's management can be found liable if care and prudent judgment aren't used to protect its information assets?

Not only can they be, but they have been. While this is not necessarily true in a criminal context, it is certainly in a civil sense [such as the example just mentioned]. Courts are beginning to assess damages against corporate officers personally. When this happens, the company's directors and officers bond doesn't necessarily pay for that part of the judgment.

In the future, I expect that more courts will handle like situations similarly. They may turn to a corporate officer and say look, the corporation has got a $5 million bond, and the bonding company will pay to reimburse the company, but you have been so derelict in this circumstance, that we think that you personally are liable. Therefore, you should donate a half million dollars to the corporation's treasury for the damage you did.

Now if that happens, which is not totally unlikely in view of the current events in some courts, we are going to find corporate officers much more willing to spend money for security.

Do you think that computer systems and software vendors are more conscious now of incorporating security features into their products? Are the vendors more security-oriented than they have been in the past?

In my opinion, software and hardware providers are basically interested in generating the product that is going to sell. The kinds of things that sell information products are speed of processing, capacity, memory — none of which has anything to do with security except in a negative context. Actually, security slows down processing and requires more capacity and memory than nonsecurity systems.

As a consequence, design engineers of the hardware companies and the software developers are pursuing a product strategy of user-friendliness, not of product integrity or product security.

In the last three or four years, however, I have seen more conscious planning in terms of security for both hardware and software products — far more than I have ever seen before. I think it is finally beginning to hit home to the designers of hardware and software that the user community is now willing to pay a little more money for security or, at the least, is a little more willing to be inconvenienced.

What role should an auditor play in the planning of a good security system?

The audit staff, and in big corporations, the internal audit staff, should be intimately involved in the design of new systems that have accounting applications in mind.

The expertise of the auditor from the standpoint of building in internal security controls in the design phase should be utilized when that system is about to be designed.

Right now, I think we are finding more and more situations where the internal audit staff and finance people are intimately connected with the design of internal controls when a new system is being designed.

What part do you think training and personnel security awareness should play in a security system?

I think that training is critical. In this day and age, the way to win people over to a security perspective is by making security training part of general orientation for an organization's new employees.

As new hires are brought on-board, it should be made very clear to them that the corporation has an information protection policy and what breaches of this policy will result in.

I also recommend periodic renewals of those education efforts. This is not to terrorize people or to feature the punishment aspect of the corporation's security policy but to reinforce the security issues introduced during their orientation . . . to remind them of the value of that information.

I don't believe that employees of very large companies realize that some of their organization's most expensive assets don't appear on the balance sheet — that is their information assets.

What do you think is the most common information security breach that most companies suffer from?

Browsing. Browsing by legitimate users, the guys who aren't happy with the limited rights they have. These people are a little bit bored, and they begin to experiment by way of their terminal to see what else they can get into. It is not done with malevolence in mind. I think it stems a little more from boredom because the people that are doing it mostly tend to be very bright, sophisticated and adventuresome folks.

They don't recognize that their little act of browsing today, in a sense, is challenging the integrity of the whole system tomorrow.

How can system operators guard against browsers?

The classic protection is to have a data security administrator and a data security officer. [That way] access to the mainframe is being monitored and logs are being kept of who attempts to access programs when their access rights were inconsistent for accessing those programs.

Therefore, the best way to defend against browsing is by having good access control and by being able to log who is abusing their rights and privileges as system users. If you don't have that kind of mechanism for control, for all intents and purposes, you can't do anything about browsing.

Of all the security concerns we have talked about today, what is the issue that concerns you most?

The issue that worries me the most is that many people who manage information and information systems and work with those systems, don't fully appreciate their value. . . . If research and development is not protected down at the worker level, it will not amount to a hill of beans.

A corporation can spend $100 million on a given research effort and then not protect the results of that research to the point at which all its competition knows about it almost immediately. When this happens, whatever competitive advantage the organization might have had is dissipated because its own staff didn't realize that this $100 million worth of experimentation and research was what could have built that corporation into a multibillion dollar company.

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Centralized access control software assists telephone, helicopter firms

SAINT JOHN, New Brunswick — A Canadian phone company called on a software security system to serve double duty while it was being installed. Before the software began controlling access to corporate data, it had to help the company find out who was using the data in the first place.

The confusion at New Brunswick Telephone Co. arose from a piecemeal security system that had been in place before the installation, which took place in 1980. Until then, people who owned data had been responsible for securing it, according to DP Security Coordinator Preston Taylor, and each group implemented controls pretty much as it pleased.

USER REPORT

NEW BRUNSWICK TELEPHONE CO.

Problem:
Inability to know who used any given application; piecemeal access control.

Solution:
Centralized access control software.

Benefits:
Knowledge of usage patterns; sense of security; end-user respect for security procedures.

"We really didn't have the tools to know who was into what," Taylor said. The phone company, in fact, chose its centralized access control software, SKK, Inc.'s ACF2, primarily for that reason.

The software operated on the basis of access by exception, denying access to data unless it was specifically granted. No user could tap in to any data base running under IBM's IMS or MVS on New Brunswick Telephone's 24M-byte IBM 3081 host unless system administrators arranged for him to do so.

To determine who needed to have access granted and to what types of files, New Brunswick Telephone's DP security staff took two preliminary steps:

- It asked programmers who had been responsible for maintaining applications programs to help develop access rules for those programs and to determine who had been using the applications in the past.
- It brought up the security software in a mode that tracked access attempts as users made them, without denying access in any case.

From the information it gathered, New Brunswick Telephone established a set of rules it hoped to impose under its security software. Before the firm put the rules in place, however, it switched ACF2 into an intermediate mode that gave users a warning every time they gained access to something that would be denied once the rules went into effect.

After security staff members and users alike were satisfied with the way the security scheme worked in this intermediate mode, they switched to a permanent security mode, one in which the system denied any access attempt for which a user did not have specific authorization.

Altogether, the implementation took about six months, according to Taylor. "The major portion of that time," he said, "wasn't so much a matter of making the program work as it was of training users to think securely." The effort on that front consisted of a number of actions.

First, before the software was installed, New Brunswick Telephone drafted a written security policy and circulated the policy to end users. The policy explained why the firm chose to implement centralized security procedures and how these procedures would affect users' jobs.

Security staff members then made presentations to user groups to further explain the implications. "This gave us the chance to disarm fears that we would be making people's jobs more difficult," Taylor said. Few users had any qualms with the proposed system. Those who did — mainly heavy users who feared that security constraints might slow down their work — came away with the satisfaction that their concerns were being addressed.

Next, during the implementation itself, the firm appointed one person in each affected user group as security coordinator. That person held responsibility for settling problems that arose. "This gave users a specific person to call with questions," Taylor said. "It humanized the process and made it less threatening."

Last, as the software came up, New Brunswick Telephone passed responsibility for data resources on to the security coordinator in each user group. As a matter of policy, the firm considers end users the true owners of all application systems, Taylor said. "Ideally, nothing goes into the system without them knowing about it." In line with this policy, the firm looks on development and maintenance programmers as custodians of users' systems.

End-user ownership dictates procedures for granting access to data through ACF2. System owners determine who should have access to their systems. They then go through a series of procedures to justify their recommendations. If management accepts the justifications and approves the recommendations, Taylor's staff sets up access through the security software.

GRAND PRAIRIE, Texas — The inflexibility of a hard-coded security system and the vulnerability of on-line access pushed a helicopter manufacturer toward a decision to install an access control software package on its host.

Until recently, Aerospatiale Helicopter Co. secured only one of its applications, an inventory system, against unauthorized access. The homegrown security scheme that the firm used for the system worked well, according to MIS Director Herb Finmark. But because it was coded within the inventory application, it imposed tremendous maintenance problems.

"Every time you added a user, changed a user's access capability or altered an authorized rule, you had to change the program," Finmark said. "That, in the long run, was ridiculous."

He said his staff of 21 programmers could not keep up with the maintenance demands and their development responsibilities without short-shrifting one or the other. Aerospatiale's programming group had initiated development on shop scheduling, project management and inventory applications and was beginning to address micro-mainframe communications issues as well.

The security scheme posed another problem in that it was limited to one application. Finmark said he wanted a more comprehensive approach to access control because Aerospatiale was leaning heavily toward on-line applications, which the firm realized were especially vulnerable to instances of unauthorized access.

Aerospatiale runs a 6M-byte IPL Systems, Inc. 4445 mainframe that supports CICS files and IBM's DL/1 data base management system under DOS/VSE. More than 100 terminals, located in operating divisions throughout the firm's headquarters, have on-line access to business applications on the host.

To keep the entire system secure, Finmark wanted to be able to control access by record and segment content, by type of access, by terminal location and by time of day.

He said he is confident that the access control software Aerospatiale installed — On-Line Software International, Inc.'s Omniguard, which went live late in 1983 — provides the necessary checks. The firm has set up the system to block access under a range of physical and functional conditions:

- Specific terminals have access to specific categories of information. Because of this constraint, anyone who tries to gain access to an accounting application from a terminal in the engineering department, for example, will fail in his attempt.
- Specific user identifications are tied to specific terminals. If a user from accounting tries to log on to a terminal in the manufacturing area, his attempt will fail.
- Terminals located in business areas that do not generally operate during the evening automatically shut down after 5 p.m. or another specified hour, unless a system administrator grants an exception through the software.

USER REPORT

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Problem:
Inflexibility of hard-coded security system; vulnerability of on-line data.

Solution:
Centralized access control software.

Benefits:
Low maintenance overhead; physical and functional access control.

These, combined with common limits on the access an individual can complete with his user identification, put barricades between unauthorized users and the firm's confidential information.

The security system allows authorized users some room for error, but not much. Users get a few chances to make their way into a file or data base, but if they make enough mistakes, the system renders their ter-

See **CONTROL** page 65

Aerospatiale manufactures helicopters for commercial use.

Victims have recourse

From page 57

ting the offense.

Where the amount of gain is not clear, the court may hold a hearing to determine it. This award is to be paid by the defendant in the case instead of paying a fine to the state.

The major question these laws pose is, What are we going to do to reduce the incidence of computer crime? A growing partnership between business victims and the prosecutor's office becomes easier now that there are these powerful civil tools available to the victim for legal recourse.

Like any other tools, however, they are powerful only if they are used.

Crime crackdown

From page 56

Legislators and lobbyists say that none of these issues is insurmountable, and with bipartisan support and help from industry and other interest groups, it appears that some form of computer crime and electronic privacy legislation will be enacted in 1986.

Hughes and Leahy, for example, have publicly urged that such legislation be passed before the end of the 99th Congress next December. As Sen. Charles McC. Mathias Jr. (R-Md.), cosponsor of the Leahy bill, put it, "If the law lags behind [the] technology, then our task is to revise the law to catch up."

Hacker portrait

From page 56

computer hackers.

She said hackers tend to lose interest in schoolwork that is not related to computer science, and thus, their school grades plummet. College-age hackers tend practically to live in the computer buildings on campus.

Smith's research provided additional characteristics of hackers:

- They are almost 100% male.
- Like computer programmers, hackers are extremely bright, investigative and logical thinkers, competitive and prefer structured but creative activities.
- With every successful action at the keyboard, hackers see themselves as asserting authority over the machine and whoever is connected to it, giving them a sense of power and control. Thus, they are more concerned with gaining this sensation of power than they are with the effects of their actions on others.
- Hackers tend to dabble at computer projects with no long-term goal and do not plan ahead.
- Hackers have little respect for those who know nothing about their favorite subject, computers.

"Every aspect of their lives soon becomes linked to computers," Smith said, referring to hackers' social isolation from families and nonhacker friends. "Their speech becomes short and precise in order to avoid any ambiguity in communication, and they often use computer jargon which nonhackers do not understand," she said.

But hackers find refuge in their strong bonds with other hackers, in a hacker culture where individual achievement is highly recognized. "Young hackers love to share information with each other concerning their hacker exploits," Smith said.

In fact, John F. Maxfield, a computer security consultant in Detroit who operates an investigative service called Boardscan, told *Computerworld* that one way to investigate hackers engaged in criminal activity is to catch them bragging about their exploits on electronic bulletin board networks.

The conventional approach to steering hackers away from criminal activity is to lecture them about computer ethics, but this approach has had only mixed success, Smith said. Instead, the social and environmental forces that reinforce hacker behavior must be changed, she asserted.

"It appears as if the best way to combat the narrow-mindedness that young hackers often develop is to change educational patterns so that bright students with an interest in computers are not bored in school," Smith said.

If school is more challenging, teenagers with hacker personality traits may develop interests in subjects like music.

Developing young hackers' interests in noncomputer fields would further develop their intellectual abilities, give them exposure to different environments and enhance their social skills, Smith said. She praised a special Duke University program for talented students that features a balance of challenging academic work and well-planned extracurricular activities.

Furthermore, Smith suggested that "by allowing young hackers to work with computers in an environment where the point of their work is more focused and supervision is available, they would be able to continue to enjoy working with computers at the same time that they are experiencing them as a tool with a purpose beyond the realm of hacking."

— **Mitch Betts**

Control aids firms

From page 64

minals useless. "They get three shots," Finmark explained, "and then the terminal is taken out of service."

Finmark said that in addition to preventing unauthorized access across the board, the security software has been a special boon to inventory control.

Before Aerospatiale installed the system, workers on the shop floor sometimes tried to circumvent parts acquisitions procedures. If they wanted a part, they went and got it rather than waiting through the acquisition cycle. This meant high-priority projects had to wait for parts that should have been allotted to them but got used, instead, for less important jobs.

With the security software in place, only people who are authorized to allot inventory can do so, he said, and inventory control has improved.

The system's simplicity has allowed Aerospatiale to assign maintenance tasks to its general systems staff members and to free programmers for development work. Programmers no longer spend any time at all maintaining access control.

Aerospatiale expects to extend its security umbrella even further late next year, when it begins equipping its technical field representatives with portable microcomputers.

Finmark said the portable micros, which will allow field representatives to exchange reliability and inventory information with the home office, will be secured under On-Line Software's Omniguard because they will access the host in terminal emulation mode.

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Makeshift recovery plan saves credit union after disaster

WASHINGTON, D.C. — Within hours after one of the largest fires in this city's history rendered a credit union's computer systems useless, the union began patching together a makeshift recovery plan that would keep its essential operations in service.

The U.S. Postal Service Federal Credit Union had no choice but to act fast in the wake of last year's fire. The union had made no arrangements for disaster backup or recovery, yet it needed a working system in order to dispense cash to its members on their payday — only three days away.

With some extraordinary help from its hardware and software vendors, the credit union met its deadline. But, according to Marsha King, executive vice-president, this fortunate outcome was far from assured.

"It just happened in this case that our backup was an exceptionally well-functioning team that supported us far beyond the terms of our contractual agreements," she said. "One could not ordinarily expect to depend on this emergency service from vendors without a prearranged plan."

AP/WIDE WORLD PHOTOS

This four-alarm fire set the credit union scrambling to assemble a recovery plan.

The four-alarm fire that sent the credit union on its urgent search for backup processing power was reported at 11:23 p.m. on Oct. 15, 1984. It started on the ninth floor of U.S. Postal Service Headquarters at L'Enfant Plaza and spread upward to the 10th and 11th floors before fire fighters extinguished it two hours later. Although the credit union's third-floor offices did not burn, they suffered heavily from smoke, water and chemical damage.

DP manager Ann Tran said she and King surveyed the credit union's computer room the next morning and found the union's host, a 2M-byte Digital Equipment Corp. PDP-11/70, soaked through with water. King called DEC's district office and asked for help.

The representative who answered the call said DEC could send a replacement immediately to the credit union's backup site. Tran's reply was strained, she said in a recent interview. "I don't have a site," she told the representative. "I don't have anything."

At this, the representative said he would try to arrange something with DEC's national headquarters. Two hours later, he called back to say the vendor would bring up a temporary replacement for the credit union's host at DEC's office in Lanham, Md., a 45-minute drive from Washington, D.C.

In the meantime, King and Tran contacted the credit union's software vendor, Users, Inc., to alert their representative there to the problem and to request help. The credit union stored its member data file and ran all of its services under Users' Datasafe financial services software system. Users' management promised to lend whatever help it could.

The recovery began in earnest two days later, Oct. 17, one day before Postal Service employees' scheduled Thursday payday.

Tran removed the credit union's data file tape from the L'Enfant Plaza office building and drove with it to DEC's Lanham office. There, representatives from DEC and members of the credit union's staff worked all day to bring up the system. Representatives from Users kept in touch over the telephone.

By early Thursday morning, the credit union was ready to go. At 3 a.m., King called a Users' employee for help with the system generation. "We did the sysgen together through the early morning hours," she recalled.

Once the system came up, King and Tran worked throughout the morning to post payroll data to members' accounts. On Thursday, the credit union set up a temporary office in a trailer at L'Enfant Plaza. It urged members to withdraw enough cash to tide them over for a few days; because of security concerns, the credit union had to limit trailer service to that one day.

Even after the credit union cleared this initial payday hurdle, it had a long way to go — almost four months — before it could return to normal operations. First, the union had to wait for an outside contractor to clean and bake each component and each wire of the PDP-11; the cleanup took a full month.

During this time, credit union employees had to travel from Washington, D.C., to Lanham every day to post information to members' accounts. Twelve-hour days and six-day weeks became the office norm, according to Tran.

In mid-December, the union moved back to its headquarters and began testing its hardware and software. After a week of tests, staff members had the system up and running. Clerks stopped traveling to Lanham and began posting accounts in the office.

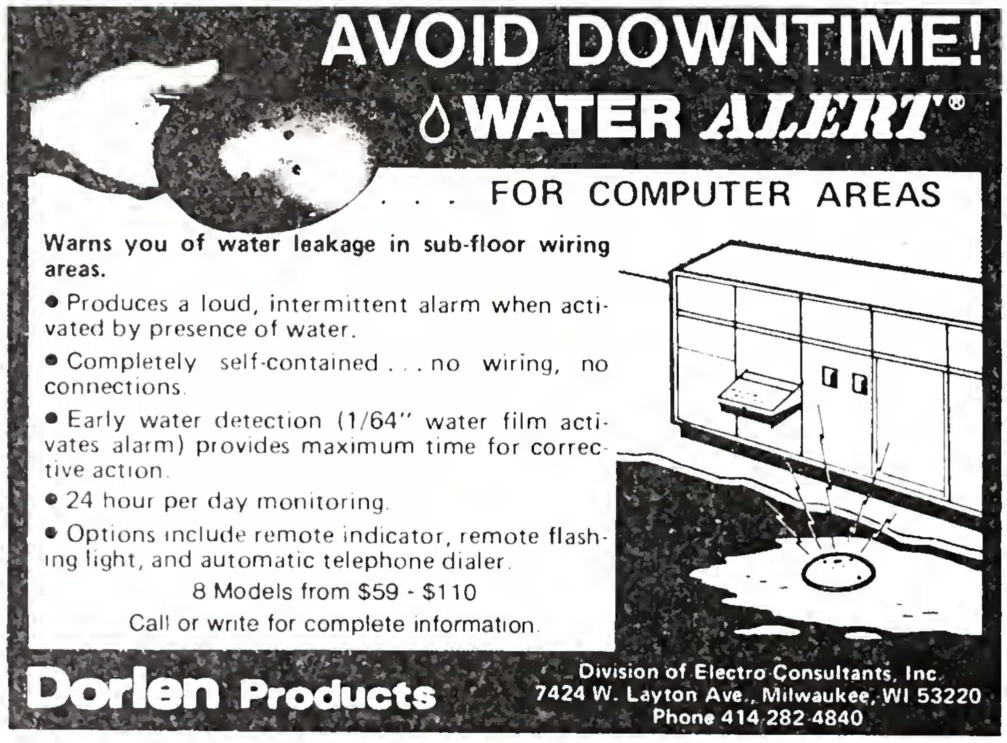
The DP shop's troubles, however, continued well into February, according to Tran. She said the PDP-11 and its software had been so thoroughly contaminated that they could not handle their normal processing tasks. Despite the staff's constant efforts, the system crashed every night for almost two months.

Normal operations resume

Finally, everything worked as it had before the fire; the union resumed normal operations in February.

In the interim between the fire and the resumption of normal services, the credit union made arrangements with other government and private sector financial service institutions so Postal Service employees could make deposits and withdrawals. In addition, the credit union's Potomac, Md., branch office operated throughout the disaster recovery, and some Postal Service employees made their financial transactions there.

Tran said the credit union learned its lesson during the disaster and is currently pulling together a permanent recovery plan.



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Futuristic schemes

From page 58

to gain access. Identification can be determined with fingerprints, palm prints, voice prints, retina prints and signature dynamics (the characteristic motions a person makes with a pen or stylus as he signs his name).

Voice-print security systems have not yet emerged from development laboratories, but devices that make other types of biometric identifications are commercially available from a number of vendors:

- **Hand geometry devices:** Esselte/Ericsson, Stellar Systems, Inc., Mitsubishi Electric Corp. and Palmguard, Inc.
- **Retinal scanners:** Eyedentify, Inc.
- **Fingerprint readers:** Fingermatrix, Inc. and Identix, Inc.
- **Signature dynamics equipment:** Crossfield Data Systems, Inc., a U.S. subsidiary of the British company De La Rue Co.

Biometric technology has been around for many years, but to date it has been expensive. One of the least expensive commercial devices, the Fingermatrix Ridge Reader, costs about $3,500 per unit. Biometric products that cost one-tenth that price should be introduced in 1986, as several companies are currently working toward that end.

A problem of resources

Any personal identification product introduces a resource problem: An organization's host must store biometric identification data for all authorized users and must process verifications each time a user wants access to the system.

As a matter of convenience and economy, it would be useful to perform the biometric identification and verification process offline, at the entry point to the system. But this presents a local storage problem; it also provides an opportunity for security breaches because local data bases can be easily compromised.

Organizations that want to use biometric identification schemes need a local authorization technique that is totally secure and relatively inexpensive. Such a technique can best be implemented with smart cards, plastic devices the size of credit cards that contain embedded computer memory.

The computer embedded within smart cards is typically an 8-bit microprocessor with between 1K and 8K bytes of memory, and this memory can be segmented so that a portion of it cannot be accessed electronically.

With smart cards, an authorized individual's unique biometric identification data can be stored locally, as can that individual's level of access to specific hosts and specific files.

Each card can locally authenticate its bearer by comparing the bearer's actual biometric data with that stored on the card.

The combination of smart cards and biometrics goes a long way toward providing definite personal authentication. The system always knows whether an authorized or unauthorized person is attempting access. No passwords are required, and if a smart card is lost or stolen, it is useless to its illegal owner.

Many European and Japanese companies make smart cards, and foreign vendors are establishing themselves in the U.S. Micro Card Technologies, Inc., for example, represents France's Groupe Bull S.A.; Paymatec/Schlumberger represents France's Schlumberger N.V.; and Casio Micro Card Corp. represents Japan's Casio Computer Co.

Several U.S. companies are gearing up to produce smart cards, as well. Among these are Corpra Research, Inc., Smart Card International, Inc. and Smart Card Systems, Inc.

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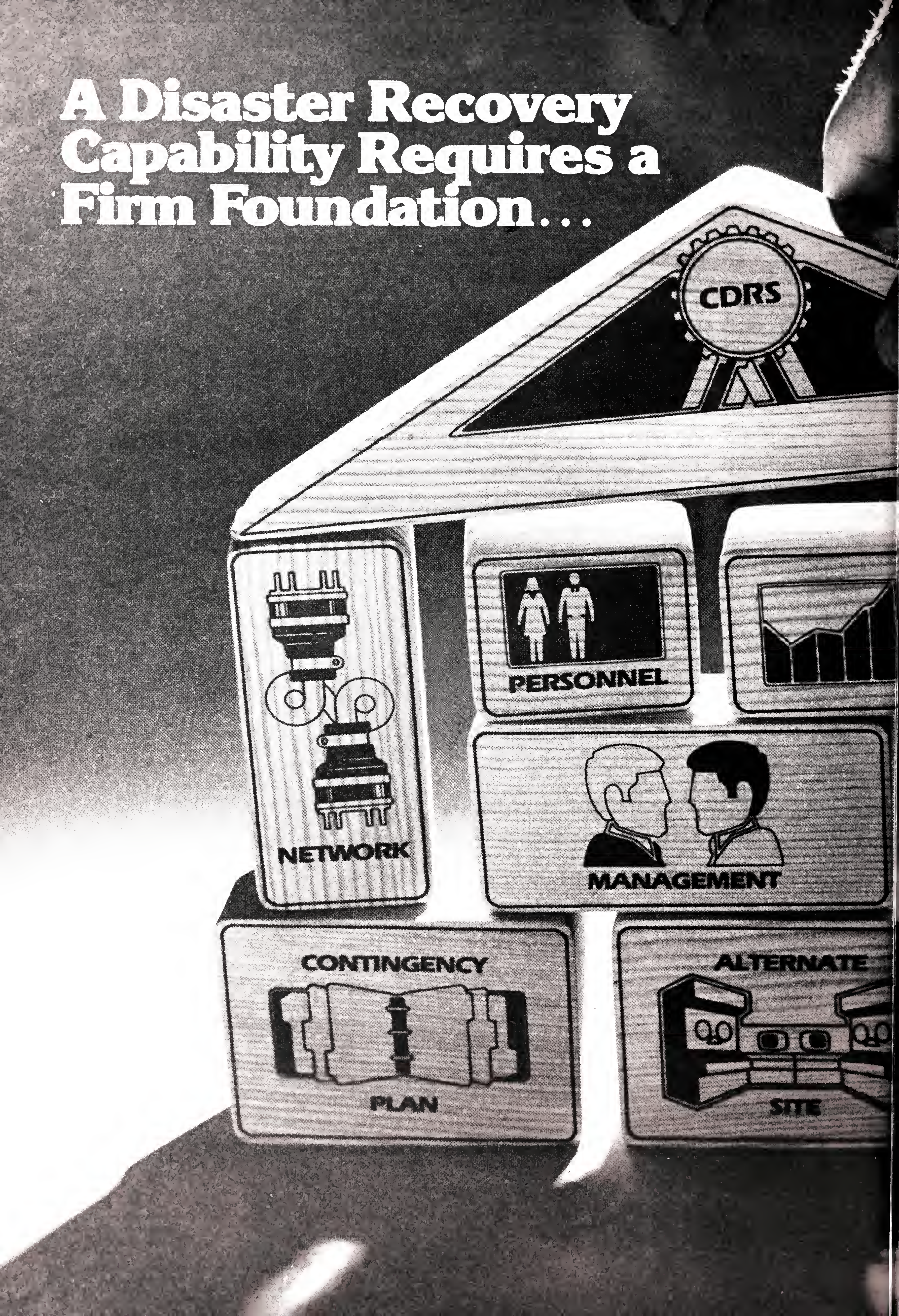

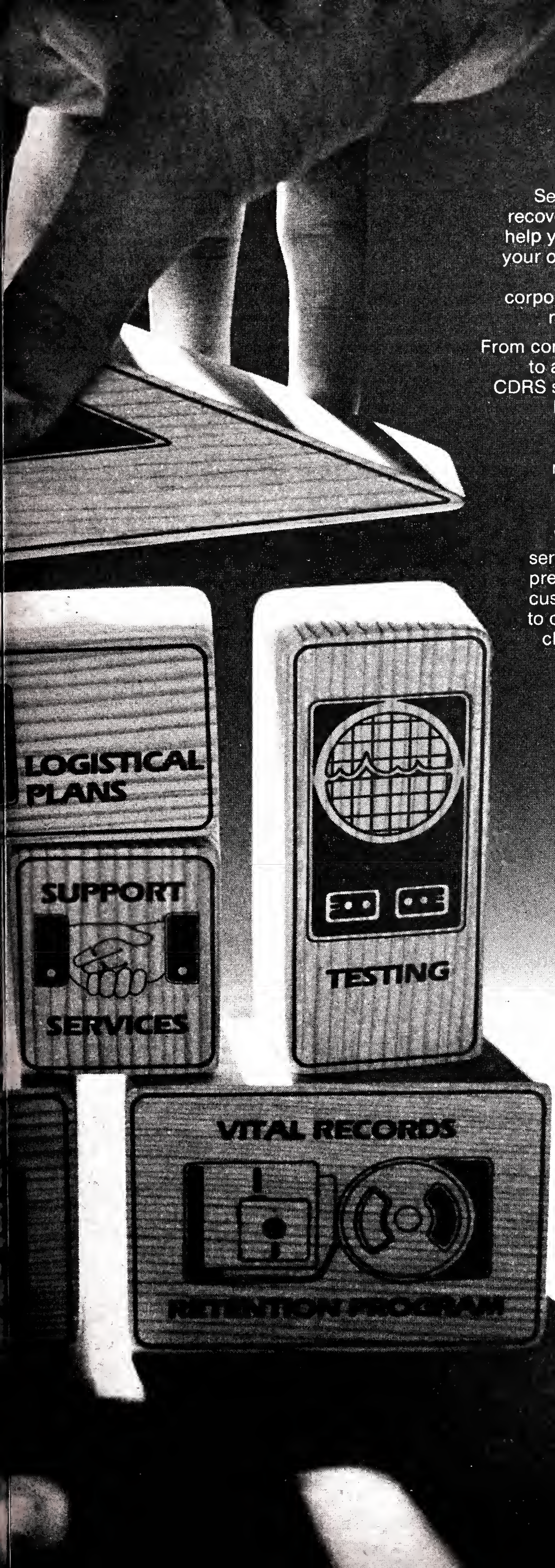

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How to assemble a comprehensive disaster recovery plan

A step-by-step guide to corporate survival

By Jeffrey E. Gardner
Special to CW‡

In the early afternoon of Sept. 28, 1983, a transformer exploded into flames next door to the data center at the First National Bank of Chicago. The coolant used in the transformer was polychlorinated biphenyis (PCB), which by itself is not dangerous. When burned, however, PCB produces dioxin, a compound that the Environmental Protection Agency considers one of the most highly toxic substances known.

As the fire marshal began making air-quality tests to determine whether the building was contaminated, the disaster recovery procedure was put into motion. The hot site was notified. Off-site storage was alerted. The recovery team was ready. An unacceptable air-quality test would have closed the 57-story downtown building instantly. Nothing could have been moved out — not one single magnetic tape. The building would have been sealed until the dioxin could be cleared away, a process that could take years.

As it turned out, the air-quality test was acceptable. Everyone went back to work the next day.

The First National Bank of Chicago was smart; it had a disaster recovery plan in place. If the primary processing center had been shut down, it would have been able to maintain its operations until it had a permanent relocation site.

Not all companies, however, have that much foresight. Security industry research has shown that 25% of the Fortune 1,000 companies do not have disaster recovery plans. Another 25% to 50% of the remainder have inadequate plans in place.

A proper disaster recovery plan ensures that an organization will survive most physical disasters such as floods, earthquakes or hurricanes, along with accidents such as fires or intentional acts of destruction. It encompasses all activity, personnel, supplies, equipment and procedures for a smooth transition to recovery processing and the return to normal processing.

The first step to designing a disaster recovery plan is to decide which applications are critical to your organization and whether they must run uninterrupted through a recovery period.

It is helpful to assign a "maximum acceptable outage" duration to each application. For example, if your organization has funds transfer applications that need to be up and running within an hour after a disaster, that should be noted in your disaster recovery plan. Performing a thorough applications risk analysis on the organization's work will define the high-priority applications in an installation.

The second step to designing a disaster recovery plan is to decide upon a place to go during recovery (see story page 71). An organization has several choices:

- It can subscribe to one or more hot sites.
- It can subscribe to a shell site.
- It can build its own disaster recovery center.

The third step is to outline all actions and procedures that should occur during recovery. The end result of this step is a master outline of procedures, inventories and personnel that is required to process the recovery work load. A copy of this document should be kept off-site with other vital records.

The detailed plan

A disaster recovery plan is based on documentation and procedures that are used in the normal production environment; the better that applications are documented for day-to-day operations, the easier it will be to develop and test a recovery plan.

A comprehensive data center disaster recovery plan should include 12 basic elements:

- **Objectives and assumptions.** The types of disasters addressed by the plan should be defined, and the conditions required for successful recovery should be identified.
- **Definition of recovery teams.** The recovery teams and individual staff member's responsibilities need to be defined. Questions such as, "Who will do what work?" and "Which team will do which task?" must be answered.
- **Vendor notification procedures.** This section of the recovery plan provides management with each vendor's emergency numbers and equipment lists, software or other resources that have been provided. Perhaps preprinted forms such as checks will be required. Equipment serial numbers and model numbers, along with maintenance contract

See **ASSEMBLING** page 71

Gardner is the vice-president of CHI/COR Information Management, Inc., a Chicago-based consulting company that specializes in disaster recovery planning.

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Alternate site vital to recovery plan

No disaster recovery plan is complete until an alternate site for recovery processing is provided. A company has three major choices when considering where to go during the recovery period: a hot site facility; a shell site facility; or custom-built, private hot site.

For near-instant recovery, a company can subscribe to one or more hot sites. Hot sites are commercially available data centers that are fully equipped to handle compatible software and applications within hours. A full backup telecommunications network can be in place on standby as well.

Hot sites are available with a variety of equipment configurations and are located throughout the U.S. They are ready for occupation in the event of an emergency and are available for regular disaster recovery testing.

Another emergency processing option, the shell site, provides a company with an air-conditioned space and a raised floor but no computing equipment. If an organization can wait four to eight weeks for equipment and communications, a shell site is less expensive.

In addition, it seems that vendors of all types rush to aid a stricken organization. IBM has been known to deliver the next box off the line to an organization, and third-party lessors will scramble to find equipment. But no matter how quickly equipment providers move, it still can take four to eight weeks to get the data communications networks established from scratch.

A company's third choice is to build its own disaster recovery center. This is expensive, but it guarantees processing resources will be available when required.

Choosing a backup facility: Check staff, hardware, extras

By John F. Sensenich
Special to CW

The selection of a data processing backup facility, or hot site, grows in importance with the level of computer dependence in a company. The greater the reliance on computers, the more vital a hot site becomes.

Managers interested in contracting with a hot site facility for a backup site can do so with a minimum of trouble if they know what to look for.

The following is a checklist of hardware, staffing and features that most reputable hot sites provide.

Hardware

A quality hot site should provide the hardware and services needed for an organization to pick up its data processing responsibilities immediately after a disaster.

The hardware basics include the following:

- CPUs.
- DASD.
- Front-end processors.
- Tape drives.
- Laser printers.
- Network equipment.

Since hot site facilities with various equipment configurations are available throughout the U.S., it is important that management chooses a hot site facility that offers hardware compatible with the equipment that is currently operating. Hot site equipment should not only be compatible with the organization's equipment, but also it should be in use and running smoothly.

Managers should look long and hard at any hot site representative that assures them that a new piece of equipment, which is vital to an organization's needs, will be installed in the very near future or in the event of a disaster.

Additionally, management should try to ascertain if the backup facility regularly upgrades its equipment to keep pace with new technology. This can be done by asking the vendor for its published migration plans.

Hot site staffing

The best equipment in the world is next to worthless without skilled people to operate it. A hot site facility should employ a core group of staff members that will help an organization move swiftly to implement its contingency plan when needed. These people should represent several disciplines so that every phase of the backup operation is professionally implemented, including start-up, testing and actual disaster planning. These staff disciplines include the following:

Telecommunications specialists. Engineers and technicians should be available to help develop, design and implement an organization's network hot site requirements. When an emergency is declared and the hot site must be occupied, these professionals can provide testing and troubleshooting assistance.

Systems programmers. Some hot sites provide systems programmers to help bring up a corporation's applications in the least amount of time. These systems programmers should be well versed in all the major operating systems in the hardware environment.

Customer support representatives. These DP professionals provide services such as documentation, configuration information, test scheduling and so on. Good customer support representatives can assure the subscriber of the successful use of the facility in test and/or disaster situations.

See **CHOOSING** page 72

Sensenich is the director of the Sungard Recovery Services Center, an IBM disaster recovery services provider based in Philadelphia.

Assembling a recovery plan

From page 70

numbers or other pertinent information that is needed to replace damaged equipment, should be provided.

■ **An action plan for the recovery process.** This plan should provide details for all aspects of the recovery process, from the time of the disaster to the return to the rebuilt data center. A step-by-step guide of the actions needed to make a smooth transition from your damaged primary site to the recovery site should be detailed. Moving plans should include detailed instructions for moving to the recovery center, equipping and moving to shell sites and rebuilding/returning to the stricken primary data center.

■ **Vital records recovery.** These documents should list locations and media for all records, both computer-readable records and manual documentation.

■ **Detailed software configuration.** These documents should detail the software and software-reconstruction procedures necessary during initial recovery at a shell site and at the primary data center.

■ **Applications priorities and operating procedures.** Specific, detailed instructions need to be provided at this point for processing all priority and nonpriority applications. Remember, high-priority applications were determined in the first step when risks were assessed.

■ **Equipment inventory and configuration.** An equipment inventory complete with configuration information for the initial recovery center, shell site processing and the primary data center should be provided.

■ **Telecommunications requirements.** This section should list in detail all of the telecommunications requirements of the initial recovery center, the shell sites (if required) and the primary data center.

■ **Data center security.** Information needed to establish immediate security at the recovery site, any required shell site and the primary data center should be detailed.

■ **Plan maintenance.** It is critical to review a disaster recovery plan frequently and include ongoing update procedures to reflect changes to your environment as they occur. After each review, the plan should be updated with current information concerning personnel, equipment, application priorities and the like.

■ **Plan testing.** Once a disaster recovery plan has been designed, it should be tested. A test for each of the 12 sections of your plan should be devised. Each test needs its own detailed procedures and expectations.

Whether it be an act of fanatics or an accident, the company that develops its disaster recovery plan today will be the survivor of tragedy tomorrow. It only takes one disaster to be out of business.

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Special Report

Micros linked into local-area networks need access controls

Users pose greatest threat to data security

By Paul Shaw
Special to CW‡

Large-scale computer systems traditionally use a variety of access control measures to protect data from unauthorized access. When microcomputers are viewed within an organization as stand-alone, single-user units, such measures usually are not considered necessary or practical.

But when microcomputers are more widely used, and when they link into existing system networks, the need for adequate access control exists.

When microcomputers are linked together in a local-area network, relatively simple procedures for access control should ensure the following:

- All users are identifiable.
- Adequate user verification is performed by passwords and IDs.
- Network access points are not left unattended once verification of a user has been completed.

The user threat

Perhaps the greatest threat to data security in a local-area network is the corruption of data by the users themselves. Controls must be in place to guard against access to sensitive data by people who are not authorized or from simultaneous update by two different users. Confidential memos and data that were once hand carried between offices or delivered in sealed envelopes can now be sent via electronic mail and may be read by anyone on the network unless adequate security controls are in place.

Microcomputers with access to mainframe data should be required to use the same access control procedures as any other dumb terminal. Standard procedures should include user identification with verification via password or key.

Users, however, should not store their identification and passwords on the microcomputer as a convenience measure to perform an automatic logon — this will negate any security facilities in place on the mainframe since the microcomputer itself may not be totally secure. As with other terminals connected to the network, microcomputers should never be left logged on and unattended so that unauthorized individuals can use the computer resource and gain access to sensitive data.

A microcomputer, unlike the vast population of the currently installed dumb terminals, is capable of storing and processing the data it obtains from the mainframe. Once critical or confidential data is moved from the relatively secure environment of the mainframe computer to the microcomputer, the microcomputer user and the organization must take additional precautions so that the information is not compromised. Alternative procedures can be developed depending on the nature of the data.

For highly sensitive data, an acceptable procedure would be to download the data to the microcomputer, analyze and process the data and then return the data to the mainframe computer for more secure storage. None of the critical data should be off-loaded from the microcomputer and stored on diskettes that may be stolen or used by unauthorized personnel. If the data must be kept at the microcomputer site, products that will encrypt the data should be used so that casual browsers or thieves cannot easily decipher the data on the diskettes.

Dial-up access

Dial-up access for microcomputers has become an attractive service for users with occasional needs to access mainframe files. But a dial-up port waiting for a phone call can be a tempting target for an information thief.

Access to dial-up telephone numbers should be restricted, and individuals who do have dial-up privileges should be aware of the security implications of distributing the access number. It's expected that once a dial-up link has been established, some type of verification of the intended user will take place.

A good mainframe security system should be monitoring dial-up lines so that repeated failed access attempts alert an operator or automatically disconnect the line. A dial-back device can also be used to minimize invalid access attempts. Once a user has dialed into an information network, these devices disconnect the caller and dial a preestablished number for that user. Not only must the user be valid, but the request must come from a valid location.

Shaw is publisher and editor of Data Processing and Communications Security *magazine. This is based on an excerpt from "Microcomputers — A Checklist of Security and Recovery Considerations," available free from Assets Protection Publishing in Madison, Wis.*

Microcomputer access control

	Yes	No
1. Have individuals authorized to use the microcomputer been identified?	☐	☐
2. Have procedures been established for authorizing new users?	☐	☐
a. Are training programs for equipment use available?	☐	☐
b. Are training programs for software applications available?	☐	☐
c. Is proficiency testing part of the authorization procedure?	☐	☐
d. Does someone have administrative responsibility for access authorization?	☐	☐
3. Have critical or sensitive data files been identified?	☐	☐
4. Are they protected from unauthorized access (by password)?	☐	☐
5. Are they protected from unauthorized update?	☐	☐
6. Are they encrypted?	☐	☐
7. Are deleted or erased files destroyed or overwritten so they cannot be recovered by utility programs?	☐	☐
Stand-alone units		
1. Is the unit protected from unauthorized access?	☐	☐
a. Locked cover or cabinet?	☐	☐
b. Locked room?	☐	☐
c. Locked power supply?	☐	☐
2. Is the unit password protected (such as with an installed chip)?	☐	☐
Networked units		
1. Are all accesses logged?	☐	☐
a. Is the user identified?	☐	☐
b. Are the date and time of access identified?	☐	☐
c. Are the functions performed identified?	☐	☐
d. Is the microcomputer identified?	☐	☐
2. Are all users and all microcomputers uniquely identified (password/card access)?	☐	☐
3. Are invalid access attempts reported?	☐	☐
4. Are access attempts verifiable (for example, a user ID/password combination)?	☐	☐
5. Are both public and private files maintained?	☐	☐
a. Are private files secure from browsing by unauthorized network users?	☐	☐
6. Are unattended units logged off or turned off when not in use?	☐	☐
Mainframe-attached units		
1. Have standardized file transfer formats been developed?	☐	☐
2. Are all file transfers logged?	☐	☐
3. Is critical data properly managed when downloaded?	☐	☐
a. Is it used for analysis only and not permanently stored on microcomputer storage media (such as diskettes or hard drive units)?	☐	☐
b. If data must be permanently stored at the microcomputer, is it encrypted or protected with password access?	☐	☐
4. Are logged-on units not left unattended?	☐	☐
5. Are standard mainframe logon procedures enforced?	☐	☐
6. Are mainframe identification codes/passwords not stored on the microcomputer?	☐	☐
Public networks/dial-up services		
1. Are customer files protected from unauthorized access by other customers?	☐	☐
2. Does the service bureau provide adequate security measures for user IDs and passwords?	☐	☐
3. Does the service bureau provide adequate backup and recovery for customer files?	☐	☐

Source: Assets Protection Publishing

Access controls are needed when microcomputers link into an existing system network in a corporate environment. This checklist presents key questions to consider when establishing microcomputer access control guidelines.

Choosing a facility: Check staff, extras

From page 71

Recovery operations specialists. These specialists will work with an organization's operations personnel to provide them with the tools and the access needed to use all the on-site equipment properly. They should be available to subscribers during all testing and disaster situations.

Administrative staff. These staff members ensure the accurate shipping and receiving of tapes. They also assist the customer in setting up its offices at the hot site and to provide security.

Consulting services. Some hot sites provide consulting services for ongoing assistance in contingency planning.

Features

A disaster recovery facility should also include certain other features, including the following:

- A fully prepared cold site (shell facility with chilled water piping, air-conditioning, fire and security equipment) ready for installation of the subscriber's own equipment if needed.
- A technical manual library for subscribers.
- A complete guide to the use of the facility.
- Start-up workshops.
- Adequate office space for subscribers.
- Creature comforts for subscribers during extended tests or actual disaster.
- A good physical location that is situated in a secure area, close to public transportation and not in an area prone to natural disasters.
- Quality and quantity telecommunications services to meet subscriber demands.

Most importantly, a reputable backup facility vendor must provide its subscribers with equal access to all of the equipment for which it is contracted. No customer or group of customers should receive preferential treatment in terms of the use of the hardware and support staff.

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Audit tools promote tight security independent of DP staff

By Ann Lavine Wolf
Special to CW

Off-the-shelf audit software tools — prewritten programs that assess the validity and accuracy of systems operations and output — promote tighter security than other auditing aids because they allow auditors to work independently of the DP staff.

The programs automatically capture user- and event-oriented data, analyze the information, document it and format it for management reports. They also compare original and modified programs to verify the accuracy of changes.

Without these packaged tools, auditors must depend on in-house programmers either to analyze systems manually or to write customized routines that do the job. In either instance, the auditor compromises himself by relying for help on the very people whose work he is calling into question.

To grant auditors the freedom that packaged auditing tools allow, an organization's management must understand what types of products are available and must choose the ones its auditors will find most useful.

There are two major categories of packaged auditing programs: those that audit data and those that compare source codes.

Data audit programs. One of the auditor's roles is to sample transactions to make sure the system processes them correctly. Data audit programs help by examining computer files, establishing data validity and producing reports. The audit programs extract data, do file handling, calculate formulas and complete footing values. Some programs also include routines for writing letters and preparing reports.

The programs vary in their ease of use. One of the most popular ones, EDP Auditor from Cullinet Software, Inc., features canned routines that require few manipulations; nontechnical auditors can use these to their advantage. More technical auditors have the option of rewriting the canned routines to develop specialized methods for auditing unique applications and systems.

Before an organization chooses a data auditing program, its MIS manager should gauge the audit team's level of technical expertise and determine the willingness of team members to master complex routines.

Before selecting a data audit program, the MIS manager should also see that the product supports the same type of data structure as the organization does, be it fixed, variable or both.

To use a data audit program, an auditor enters a request via a terminal, a punched-card reader or a magnetic tape. The program then retrieves all requested data from the host's files, performs the necessary calculations or analyses and presents the information in the requested or predetermined format.

Audit programs will perform some or all of the following tasks:

- Data sampling, including interval, random, statistical and monetary value sampling.
- Data calculation, summarization and resequencing.
- Detection of rule violations.
- Financial analysis.
- Frequency distributions and histograms.
- Linear regression with the creation of scatter diagrams.
- Trend line analysis with the creation of scatter diagrams.

In addition, some programs include data directories that store the data names and column headings that will be printed on future reports. Auditors use the data directory as a control point to maintain all descriptions of relationships, elements, formats and attributes. If a number of auditors contribute to a single audit or if one auditor will follow up later on another's work, the control that a directory offers can improve consistency.

Many packages also feature audit trails that constantly log users' data base modifications. During an audit, the auditor will review printed or on-line reports of the activity that the audit trail has captured.

Source code comparison programs. In addition to checking individual transactions, the auditor must make sure full systems have not been compromised by faulty modifications. Source code comparison programs, which match different versions of source code against each other, help the auditor perform this task.

The auditor merely runs the comparison program against historical versions of the code and makes sure recent versions generate results that are similar to those the older versions produce. He makes sure that all differences the program uncovers agree with notations in the shop's change control log; if they do not, the auditor reports the problem.

See **AUDIT** page 79

Wolf is an associate editor for "Datapro Reports on Information Security," a loose-leaf reference service offered by Datapro Research Corp. of Delran, N.J.

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Zoning concepts structure physical security planning efforts

By Richard J. Bessenhoffer
Special to CW‡

Because no two buildings and no two data centers are the same, every organization's physical security plan requires different components. Any shop can benefit, however, from structuring its physical planning efforts around a general concept known as security zoning.

Zoning depends on physical and functional partitions for the protection of resources. To implement the concept, organizations must take three types of action:

- Establish physical zones.
- Monitor the movement of employees and materials.
- Control security efforts from a central spot.

Physical zoning. An organization's effort on this first front should begin at the building's outer perimeter and work its way into the data center itself.

At the outermost perimeter, zoning requires a number of steps. Organizations should, for example, establish separate vehicle-access points and separate parking lots for employees and visitors. Both efforts allow for the positive control of vehicles and for the protection of employees' property.

The organization should, if possible, designate separate building entrances for employees and visitors. This approach promotes controlled and efficient movement of people and materials into and within the building. It should minimize any threats to areas in which computer resources reside.

Within the data center itself, an organization should implement zoning as a physical compartmentation of functional areas — one to a room. The computer room, for example, should stand apart from the data entry department and the data entry department apart from the telecommunications center. Organizations should also keep I/O, storage, computer-output microfilm and support system equipment in separate rooms, all of which should lie adjacent to the computer room and have immediate, controlled access to it.

Compartmentation of functional areas within the data center helps an organization enforce its employee traffic patterns and preserve the integrity of its security and operations plans. Zoned areas also offer high levels of security and logical maintenance of work flow patterns.

Monitoring. Once an organization physically separates its functional areas, it must install security systems to control the movement of people and materials within and between zones.

An effective device for controlling movement is a card-activated access system consisting of card readers that are placed strategically to channel traffic into and through different zones. Levels of access authority should depend entirely on employees' need to enter sensitive areas. All nonessential traffic poses a threat to the data center.

A network of doors and gates fitted with alarms can further help an organization channel its pedestrian traffic. These barriers should stand wherever necessary — both between and within zones — to prevent wanderings outside of routine traffic routes. Emergency exits, for example, should be identified and monitored.

Every organization must, of course, make sure its entire access-control system complies with municipal life safety codes regarding means of egress. No security measure should work to trap employees if an emergency arises.

Motion detection devices like closed-circuit television systems can work in conjunction with access-control measures to track unauthorized activities in remotely located areas. These include storage rooms, stairwells, crawl spaces, equipment rooms and executive offices.

Closed-circuit television systems have the potential to clash with the corporate image. Cooperation between the security director and the building architect should help an organization attain effective security through discreet installations.

For most firms, access control and closed-circuit television systems should suffice for monitoring movement within and between zones. But companies whose data center is located on the first or second floor of a building that has glass perimeter walls may require an additional system, one composed of sound attenuator sensors. These sensors detect the cutting or breaking of glass and sound an alarm signal within the security monitoring station.

Central control. An essential element of the overall security posture is the capability to monitor and control the various systems, subsystems and components that make up the security system, including fire pro-

See **ZONING** page 79

Bessenhoffer is vice-president of facility design and security for Total Assets Protection, Inc., a computer security consulting and architectural/engineering firm based in Arlington, Texas.

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Four crucial elements form basis of security zoning plan

To put the concept of security zoning into practice, an organization must take specific measures that address four areas of concern:

Lighting. Proper lighting plays three important roles in security: It helps a firm maintain normal operations, ensures employee safety and promotes the effective use of surveillance equipment.

Standard interior lighting levels suffice for most areas, but zones equipped with closed-circuit television systems require special attention. If an area under closed-circuit surveillance is inadequately illuminated, it will have to be monitored by low-light-level cameras. These cameras are expensive, and they drive up the cost of the closed-circuit television system.

Organizations must also pay special attention to their exterior lighting designs. Outside lighting is usually soft to complement the aesthetics of the building and its grounds. But exterior lighting must provide enough illumination for cameras to produce high-quality videos. An organization's security director and its building architect should try to agree on some middle ground.

Building construction. The construction of the computer center plays an equally vital role: It can protect against the spread of fire, prevent most attempts at forced entry and help maintain environmental controls.

Organizations should surround their computer rooms and associated areas with walls, ceilings and floors that have two-hour fire resistance ratings. Walls should also include vapor barriers that help maintain a controlled environment within each room.

Building designers should avoid glass, because glass doors and windows cannot provide sufficient protection against the spread of fire. Moreover, glass serves to increase the data center's visibility and, in so doing, reduces an organization's overall security posture.

Fire protection. Fires rarely break out in computer environments, but when they do, their impact can be catastrophic. To prevent widespread damage, every organization should institute fire protection as a major element of its computer center security plan.

In addition to installing fire-resistant barriers around the computer center, every organization should take steps to promote speed, accuracy and efficiency in detecting and extinguishing fires and in alerting and protecting employees.

Automatic detection systems should rely on devices that detect particles of fire and smoke in the air. The two most common system types rely on either ionization detectors or photoelectric detectors; these are sufficient for most purposes.

To aid in extinguishing fires quickly, automatic detection systems should interface with automatic suppression systems. Halogenated suppressants are most effective. Halon discharges quickly and extinguishes fires rapidly. In addition, it has the ability to penetrate computer component cabinetry. All of these abilities serve to keep downtime minimal.

Some municipalities or insurance firms may require their business constituents or customers to use water for fire supression. But water and highly energized equipment simply do not mix. If an organization must install a system of water sprinklers, it should install the system as a supplement to its halon system — not as a replacement.

To be effective in alerting employees, fire alarms must be distinct from all other alarms in the facility. In addition, the alarms should be capable of warning personnel of different stages in the progression of a fire.

Another crucial element of the fire protection plan is an employee training program. An organization must educate all its employees so they fully understand the system, have no fear of its intent or operation and recognize it as a preventive measure to a life-threatening condition.

Local fire authorities often provide help with employee training programs, and their value extends to other areas as well. If an organization keeps its local fire department abreast of its security measures, the department will respond well to any emergency. Security directors should keep this in mind and maintain a strong liaison with the fire department. In any case, most business fire protection plans require the approval of local fire authorities.

Mechanical and electrical support systems. Computer operations depend totally on systems for air-conditioning, chilled water and power generation, among other requirements. Because of this dependence, these systems must stay as secure as any others.

Some or all of these systems, however, reside outside of the secured computer center (in cooling towers, chilled-water condenser farms or transformer pads, for example). The security plan for the computer center, then, must extend to these usually unprotected areas.

— **Richard J. Bessenhoffer**

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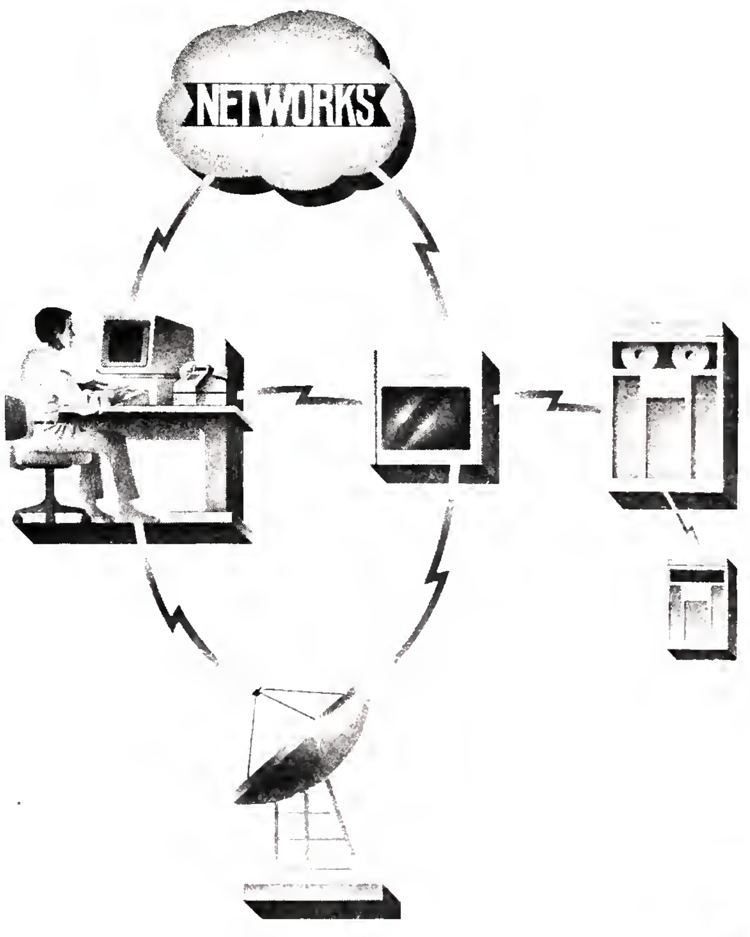

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Headhunter offers tips on hiring security professionals

By Cameron Carey
Special to CW

The most elaborate security controls will do little good if an organization hires the wrong people to implement and maintain them.

Without a great deal of study, no outsider can gauge any one shop's particular staffing needs. But general rules for hiring security professionals apply across the board. Any shop large enough to warrant a comprehensive security plan needs a dedicated, competent security staff to keep that plan on target.

In most medium-size firms — those with between 150 and 250 MIS staff members — the MIS manager should concentrate on hiring a core staff of four security professionals:

- An information security administrator.
- A data access control specialist.
- A data access control analyst.
- A contingency planning specialist.

Larger firms, of course, can hire two or more people within each job category, and smaller firms may want to give two or more tasks to one person. No matter what a shop's size, however, its MIS manager must find people with the abilities to fill each role.

Security administrator. This employee is responsible for securing all information that the organization deems important to itself and its customers — regardless of storage or processing medium.

To find a person with the ability to carry out this duty, the MIS manager should look for applicants with three general strengths: a strong sense of office politics, excellent communication skills and a substantial amount of experience in security.

Other useful traits are a high threshold for frustration, a great deal of cooperativeness and a willingness to do whatever must be done to resolve problems before they land on top managers' desks.

More specifically, the person who fills the administrator's slot should have solid experience with plans, cost/benefit analyses, policies, standards, data access control schemes, systems reviews, micro-mainframe and communications security procedures, contingency planning efforts, employee security awareness programs and administrative controls.

Anyone who has a managerial or project management background in DP, security or controls should fit the bill to some extent.

Annual salaries for people who excel in this position generally range from about $48,000 to $65,000.

Data access control specialist. This senior-level employee is responsible for implementing logical access to data. He makes sure that workers who need to find special information can do so and that people who do not need the information cannot get it.

The traits the MIS manager should seek in a data access control specialist are an understanding of the far-reaching repercussions of access control, an ability to communicate well and the experience to make judgments about access control packages.

Strong candidates for this position will have logged between three and five years of experience as a DP analyst, with hands-on use of a popular mainframe access control package. Anyone who has gone through the effort of comparing different vendors' offerings is especially well qualified. Experience with definitional problems — data ownership or departmental vs. individual access to data sets, for example — also weighs in an applicant's favor.

Increasingly, the problems of limiting microcomputer access to mainframe data will fall on this employee's shoulders, so experience in micro-mainframe links cannot hurt.

Senior data access control specialists generally earn between $38,000 and $45,000 a year.

Data access control analyst. This employee, who supports the data access control specialist, takes responsibility for daily administration of the security system. The analyst also generates reports and reviews security violations.

Strong candidates for the job will understand how to operate a security system and make use of its various features. They will be able to investigate unauthorized access attempts, establish administrative controls and procedures and help users understand how to cope with access control software.

To do these jobs well, applicants must understand how to use security software tools with proficiency; a two- to four-year background in DP is essential.

Access control analysts' annual salaries generally range from $31,000 to $35,000.

Contingency planning specialist. This senior-level employee sets up

---

Carey is founder and president of Computer Security Placement Service, Inc., a recruiting firm based in Northboro, Mass.

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CW/15

the plan that will keep the organization functioning should a hurricane or fire knock out the data center and follows through with that plan if such a disaster actually strikes. The person in this position also develops and documents a plan for bringing operations back to normal after the disaster passes.

MIS managers should look to hire a person who has proved, in a previous job, that he can integrate security and organizational plans, research different types of backup site strategies and initiate efforts to determine which of an organization's hardware and software systems are essential to its business.

In addition, anyone who takes on an organization's contingency planning role must be able to develop teams of emergency workers and to keep communication flowing among team members if a disaster occurs. The candidate should also have the skill to prepare press releases in case an organization's operating problems must be explained to the public.

Annual salaries for these professionals typically run between $38,000 and $45,000, depending on total responsibility and geographic location. Mid-level analysts who support the contingency specialist usually earn between $35,000 and $39,000 annually.

Annual payroll budget — DP security staff*

Security administrator	**$48,000 to $65,000**
Access control specialist	**$38,000 to $45,000**
Access control analyst	**$31,000 to $35,000**
Contingency planning specialist	**$38,000 to $45,000**
Total	**$155,000 to $190,000**

*This core security staff is recommended for companies with MIS shops of between 150 and 250 DP professionals.

Source: Computer Placement Services, Inc.

Specialists for special needs

Any organization that promotes substantial efforts in data communications or microcomputer use should also consider hiring security professionals who specialize in those fields.

Candidates who seek to manage an organization's micro security should have worked for two years in a data access control position. With this background and some experience in using and evaluating micros, they should have no trouble learning the specifics of micro security.

Applicants who want to manage communications security should have research and evaluation experience with security tools such as encryption and dial-up devices. If an applicant is familiar with such tools and has a solid technical background in communications, he should be well suited for the job.

Salary information for these specialists is sparse. An educated estimate, however, would indicate that micro security professionals earn between $40,000 and $45,000 annually and communications security professionals earn between $45,000 and $50,000.

Audit tools promote security

From page 74

Vendors offer source code comparison programs that compare different types of elements.

Packages also differ in their capabilities. Some only compare entire programs; others compare specific areas within two programs. Still others look for similar text anywhere in the code, ignoring the line numbers of the two program codes that are under comparison.

Auditors find this option especially helpful if the organization's programmers do not follow a specific numbering scheme.

Organizations can also purchase packages that make comparisons between two source code libraries. These products generally let the auditor choose whether to compare entire libraries or selective subsets of libraries or to make comparisons only between elements that appear in both libraries.

Some source code comparison programs generate output to either printers or display terminals. If an auditor is comfortable using a terminal to verify a program's code, the display option lets him eliminate unnecessary paper output.

An organization's data audit software package may include source code comparison features. If it does not, the MIS manager should not hesitate to purchase a stand-alone program that does.

Zoning concepts structure efforts

From page 76

tection and environmental networks. This usually requires a central security console.

The console should be the termination point for all card readers, alarm sensors, fire protection systems and other devices that require constant monitoring.

From the console, trained security personnel can monitor the status of all systems and evaluate activities occurring in the protected areas. They can also respond to emergency conditions and keep management informed of the security posture.

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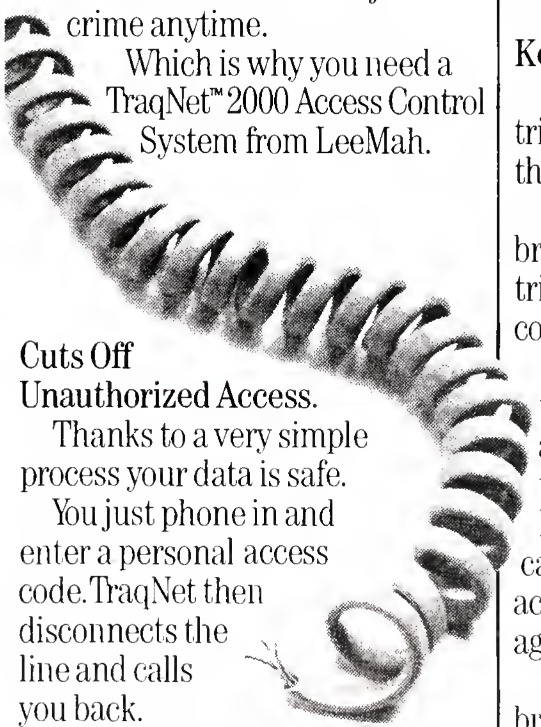

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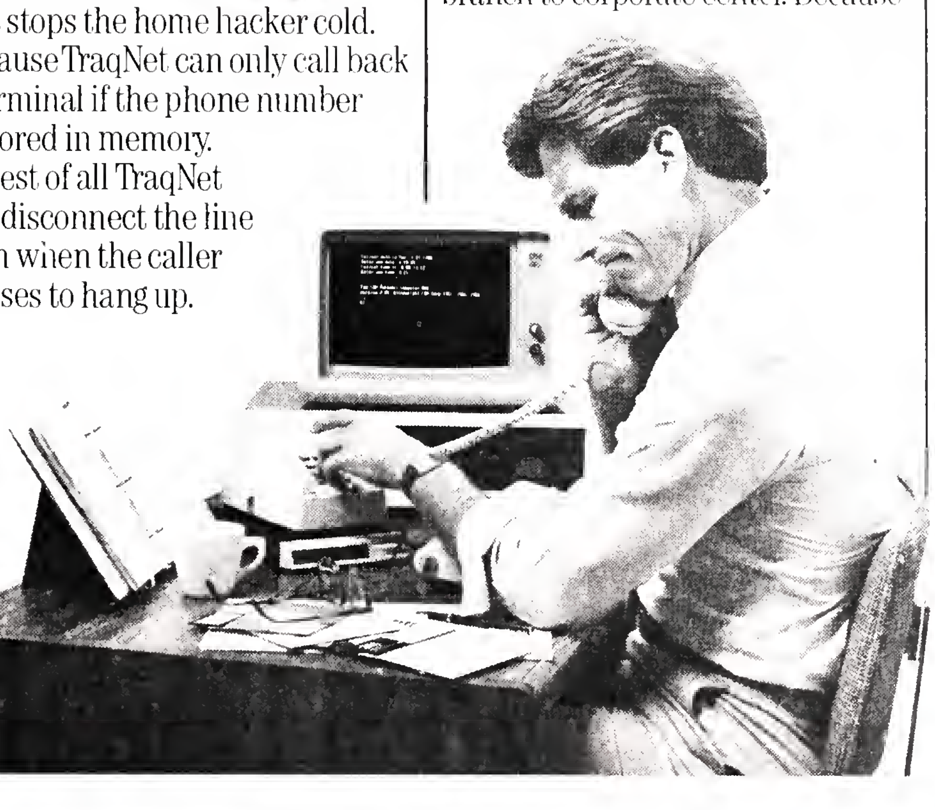

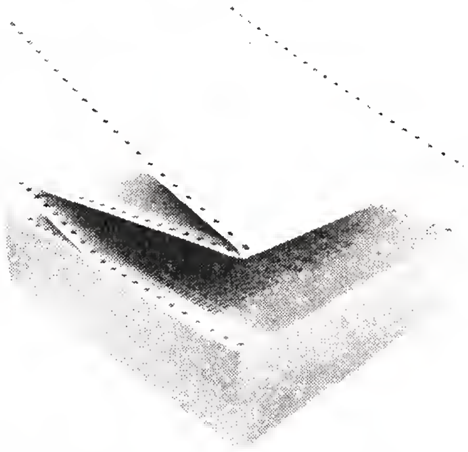

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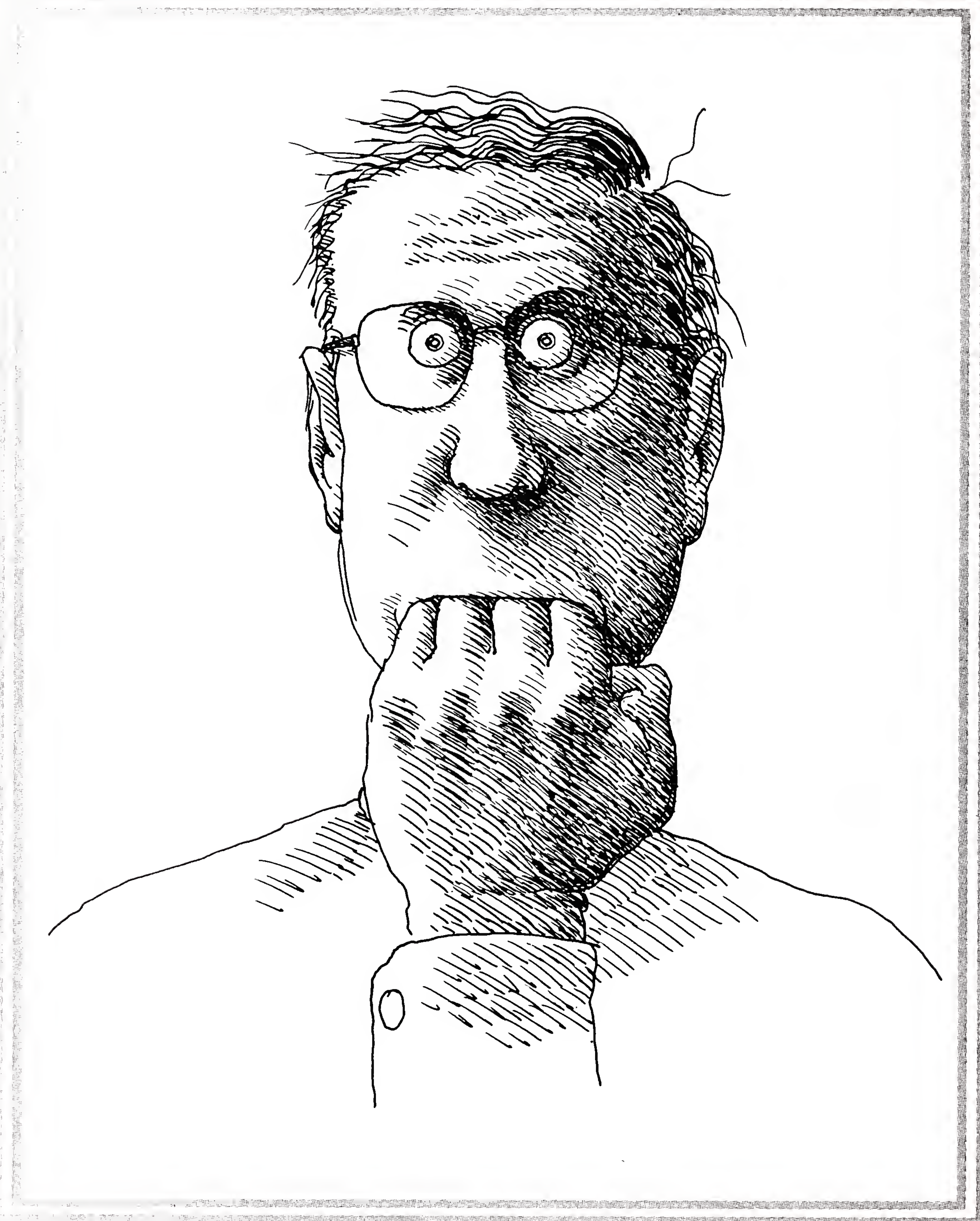

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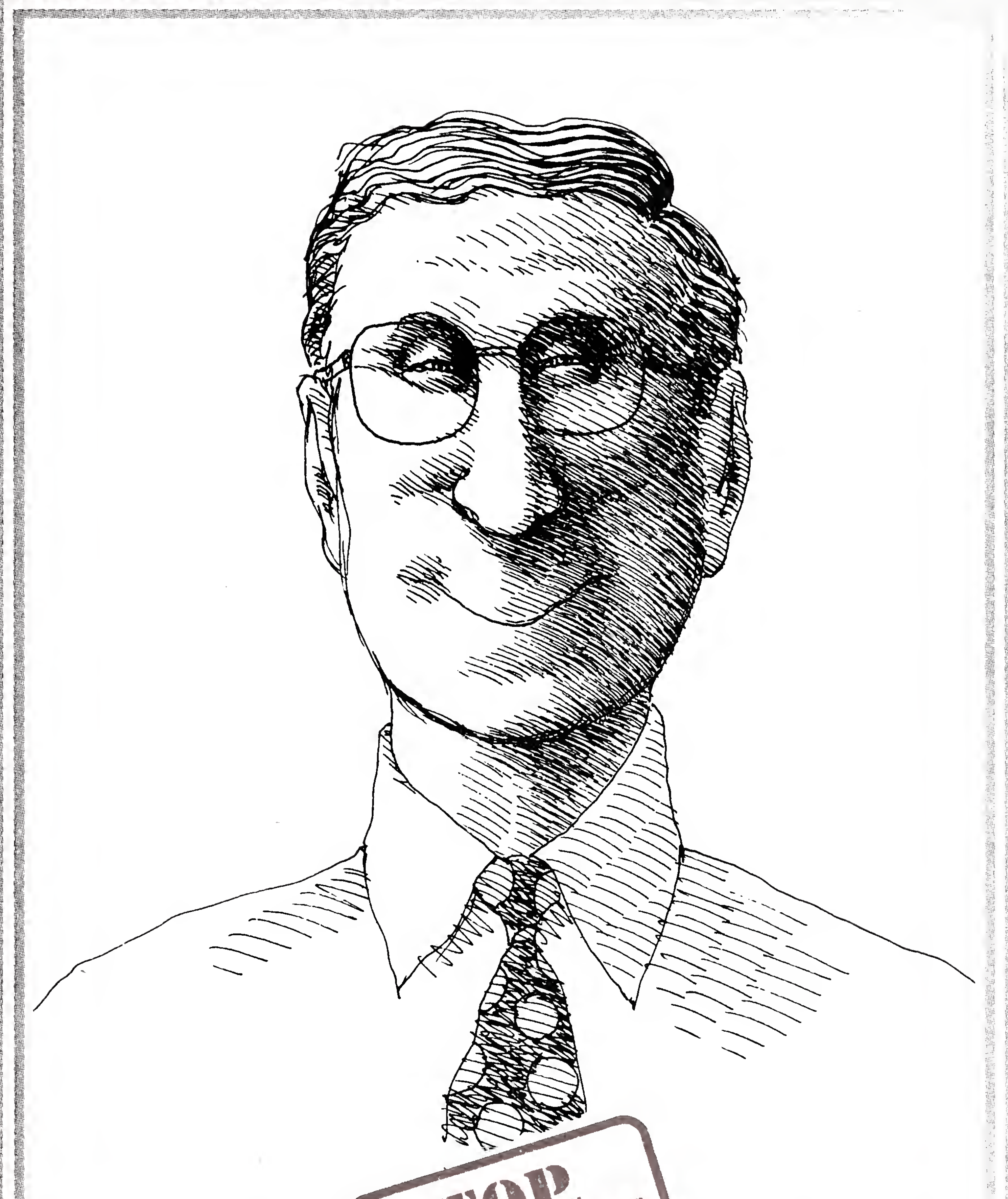

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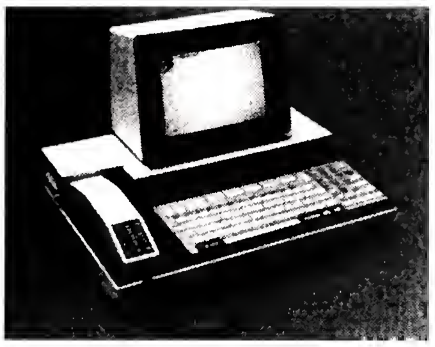
NEW PRODUCTS

Insystec office system bows

Integrates processing, communications equipment

Insystec, Inc. of Winter Park, Fla., has introduced an office automation system that integrates the functions of many types of information processing and communications equipment.

The system, based on a voice/data workstation, is offered in three compatible models: the Executive, which is portable; the Professional, which has a tilting 25-line CRT terminal that fits on top of the basic computer unit; and the Secretary, with a tilting, swiveling 27-line CRT terminal mounted on a pedestal.


The Professional workstation

The basic workstation contains a microcomputer with integrated word processing, spreadsheet, data base, graphics and communications software, a video display and keyboard, a 3½-in. disk drive, a complete Ethernet local-area network interface, a modem, a private branch exchange (PBX)-compatible telephone, a telephone answering machine, a speakerphone, a dictation machine, electronic mail with digital voice messaging and an officewide electronic calendar. It provides interfaces to various other devices including Winchester drives, printers and telephone headsets.

The computer's proprietary operating system permits change from one application to another, provides a multitasking windowing environment and accepts Microsoft Corp. MS-DOS as a guest operating system. The communications software includes terminal emulation for Digital Equipment Corp. VT100 and IBM 3270, and 1M byte of random-access memory (RAM) is standard.

Each workstation's telephone provides two-line capability, tone or pulse dialing, automatic directory dialing and autoredial. It can be used with an office PBX or a normal direct line.

The built-in modem will transmit at 300 and 600 bit/sec. in both half- and full-duplex modes and at 1,200 bit/sec. in half-duplex mode. It meets AT&T 202 as well as Consultative Committee on International Telephony and Telegraphy specifications. The Ethernet local-area network sends information as fast as 10M bit/sec.

The Insystec integrated voice/data workstations are being marketed to OEMs. The price for each model is $4,000. The workstations will be available during the first quarter of 1986.

Telecomputer workstation debuts

Compushop, Inc. of Dallas, a wholly owned subsidiary of Bell Atlantic Corp., announced that it will sell a version of Compaq Telecommunication Corp.'s Telecompaq workstation, which combines a personal computer with built-in telephone and data communications features.

Carrying a base price of $4,195, the Alex Telecomputer was designed to collect, analyze and communicate information. The unit accesses phone features such as speed dialing and automatic redial as well as computer features such as a phone directory, electronic mail, a personal calendar, an electronic notepad and a calculator. Functions are accessed by touching a button labeled with the function name.

The unit inclues 80 programmable private branch exchange features, a speakerphone, tone or pulse dialing and last-number redial.

Alex uses a 16-bit Intel Corp. 8086 microprocessor and the Microsoft Corp. MS-DOS operating system. The base configuration includes 384K bytes of internal memory, while another model with 640K bytes of memory costs $4,495.

Alloy beefs up multiuser micro line

Alloy Computer Products, Inc. of Framingham, Mass., has enhanced its PC-Plus Family of multiuser personal computer products, enabling them to access data faster and run under IBM PC-DOS 3 or Microsoft Corp. MS-DOS 3.

According to a spokesman, the PC-Plus products are now equipped with the NEC Corp. V20 microprocessor that provides up to 30% faster performance than before.

The PC-Plus Family cluster approach to multiuser systems uses integrated personal computer storage subsystems, such as Alloy's multiuser expansion board, PC-Slave/16 and a terminal for each user to create personal computer clusters of up to 31 terminals operating off an IBM Personal Computer host. Terminals attached to the host function as fully configured, networked personal computers.

Alloy's proprietary multiuser software permits sharing of data and peripherals by clustered terminals and provides file and record locking capabilities.

Runs with PC-DOS 3 or MS-DOS 3

The enhanced software, ATNX and MTNX, allows disk caching and supports hard-disk volumes over 32M bytes. ATNX runs with PC-DOS 3 or MS-DOS 3 and higher on the host personal computer. It is priced at $295. Current users of Alloy's RTNX software can upgrade to ATNX for $100.

MTNX software provides all the features of ATNX, plus it allows users to run several tasks concurrently on a cluster's host personal computer. MTNX is priced at $395. Current users of Alloy's RTNX software can upgrade to MTNX for $200.

PC-Slave/16 boards now include the NEC V20 chip, which, in addition to reportedly increasing processing speeds, executes all Intel Corp. 8088 instructions and provides IBM compatibility. The PC-Slave/16 is priced at $895 with 256K bytes of random-access memory (RAM). In additional RAM configurations of 512K bytes, 768K bytes and 1M byte, prices are $995, $1,095 and $1,195, respectively.

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Samna ports word processing, office automation software

Samna Corp. of Atlanta has ported its Samna Word III word processing software and Samna+ office automation software from DOS operating systems to computers running under the AT&T Unix System V operating system.

Samna Word III is a word processing package that incorporates features such as spelling correction, automatic table of contents and index generation, line drawing, footnote, glossary and mail merge.

Samna+ is a document processing package that combines word processing capabilities, such as an integrated spreadsheet and a word base manager. It provides capabilities such as IBM Data Interchange Format file translation, floating cells and the ability to print to multiple printers.

Both Samna Word III and Samna+ support the IBM Document Content Architecture format.

The Unix versions will be available in March 1986. Prices for Word III will range from approximately $1,250 for the minimum configuration to $11,000 for a 30-user system. There is a charge of about $325 for each additional user over the 30-user limit. Prices for Samna+ will range from about $1,550 for the minimum configuration to about $13,850 for a 30-user system. The charge for each additional user will be about $410.

Versanet network kits out

Software Clearing House, Inc. of Cincinnati has announced Versanet, a personal computer interconnection system developed by Masterlink, Inc.

Versanet, designed for use with IBM Personal Computers and compatibles, is a fully functional network that automatically allows users of application programs and IBM PC-DOS or Microsoft Corp. MS-DOS commands on personal computers to access files and printers on other personal computers.

Versanet includes Masterlink's High-speed Upgrade Box (HUB), an external device that upgrades signals from a personal computer's serial port and pumps them up to 1,000 ft with effective throughput capacity of up to 50,000 char./sec.

Versanet's software includes Netbios, which makes a personal computer-to-HUB connection emulate an IBM Network Adapter card, providing IBM PC Network compatibility.

Versanet kits include everything necessary to create the network. Up to 32 personal computers can be linked using Versanet. It supports PC-DOS and MS-DOS Versions 2 through 3.1. Prices range from $225 to $175 per personal computer depending on the number of micros. Delivery is scheduled for January.

Information appearing in the New Products section has been provided by manufacturers and has not been independently validated by Computerworld.

PRICE REDUCTIONS

Codex Corp. has announced price reductions on the **Codex 2270/2280** series of error-correcting personal computer modems.

The line consists of 13 products. The price range is now $395 to $995, depending on the model.

Codex, 20 Cabot Blvd., Mansfield, Mass. 02048.

■

Through February, **Multimate International Corp.** will include $245 worth of software with each purchase of its **Multimate Advantage Professional Word Processor**.

Included are Multimate Graphlink Text and Graphics Integrator that allows integration of graphics produced by other software into Multimate documents and Multimate On-File Information Manager that uses index card-style operation to organize and file data.

System requirements are an IBM Personal Computer, Personal Computer XT, AT or compatible running IBM PC-DOS 2 or Microsoft Corp. MS-DOS 2 or higher. Multimate Advantage requires 320K bytes of random-access memory.

Multimate Graphlink requires a graphics or laser printer and IBM or compatible color graphics board, the vendor said.

Multimate International, 52 Oakland Ave., East Hartford, Conn. 06108.

SOFTWARE & SERVICES

Systems software

Software Assistance Co. has announced **SA/Archive**, a software program for IBM's VM operating system.

SA/Archive operates as a disconnected virtual machine that provides archive facilities. Files may be saved by the user, or there is an automatic save feature that may be set to save at certain times of the day. System-wide defaults are allowed, as are defaults for individual users. File security is provided.

SA/Archive is priced at $7,000.

Software Assistance, P.O. Box 2101, Santa Clara, Calif. 95055.

■

Signal Technology, Inc. has announced that its **Pacs Plus** software for tracking hardware and software usage in the Digital Equipment Corp. VAX/VMS environment now includes DEC Vaxclusters.

The product lets users process all resource data from a Vaxcluster in one central data base. The product runs on all VMS versions.

Pacs Plus prices start at $2,450.

Signal Technology, 5951 Encina Road, Goleta, Calif. 93117.

■

Syncsort, Inc. has announced **Release 5.3** of **Syncsort CMS**, its sort/merge product for IBM VM/CMS environments.

Release 5.3 runs up to three times faster than previous releases. It has an enhanced Help facility, an alternate parameter file and a new exit interface that supports user exits.

Syncsoft CMS is licensed at $9,300 for three years.

Syncsort, 560 Sylvan Ave., Englewood Cliffs, N.J. 07632.

Productivity aids

Raxco, Inc. has announced **Release 4** of its **Rabbit-5 Backup and Restore System** that backs up data from disk to tape for Digital Equipment Corp. VAX/VMS systems.

Rabbit-5 provides automated resources such as tape librarian, command procedures and use of the VMS batch mechanism. Users may access data in disks other than the one being backed up while backup is done.

Full and incremental backup are available as are a full wild carding in file specification, inclusion and exclusion file lists, file journaling and progress reporting options. Rabbit-5 can store up to eight levels of subdirectories.

Rabbit-5 Release 4 will be available Jan. 1, 1986. Prices range from $995 to $6,995, depending on the CPU used.

Raxco, 1370 Piccard Drive, Rockville, Md. 20850.

■

Softouch Systems, Inc. has announced **CICS-Juggler/SVT**.

The software allows users to have up to nine concurrently active CICS transactions on the same terminal. Through the use of function keys, the user can move between applications without logging off or losing the current status of transactions.

The product is available for all operating systems and CICS releases. It costs $3,500 for the DOS version and $5,000 for the MVS version.

Softouch Systems, 8265 S. Walker, Oklahoma City, Okla. 73139.

■

Dylakor Co. has announced **Release 5** of its **Dyl-280** IBM mainframe utility/report writer.

Release 5 offers the implementation of commands to support more efficient handling and qualifications of data names. A capability called Move Corresponding has been added to allow identically named fields to be moved between records. The program's cross-referencing index now handles tag names and data name qualification.

DYL-280 Release 5 costs $11,000 for both OS and DOS versions.

Dylakor, 17418 Chatsworth St., Grenada Hills, Calif. 91344.

■

Computer Information by Design, Inc. has announced **Modify Writer**, a code generator for use with Information Builders, Inc.'s fourth-generation language Focus.

Modify Writer runs on IBM TSO and CMS operating systems. It automatically generates a general-purpose maintenance procedure, with color attributes optional, that is based on a Focus data description.

Modify Writer is priced at $4,500.

Computer Information by Design, Suite 411, 2444 Wilshire Blvd., Santa Monica, Calif. 90403.

■

Financial Technologies International, Inc. has announced **DBaid for DBRC**, a menu-driven productivity tool for use with the IBM IMS Data Base Recovery Control (DBRC) feature.

DBaid for DBRC operates under IBM ISPF and is used to generate DBRC cards and execute DBRC in foreground or background mode. It facilitates setup, execution and maintain-recovery procedures for IMS

Continued on page 85

WHY FOLLOWERS OFTEN LOSE SIGHT OF THE LEADER

In their predictable attempts to follow our lead, our competitors have invariably lost their sense of direction. So when you first look at the new AGILE 6287, our competitors are precisely where you'd expect.

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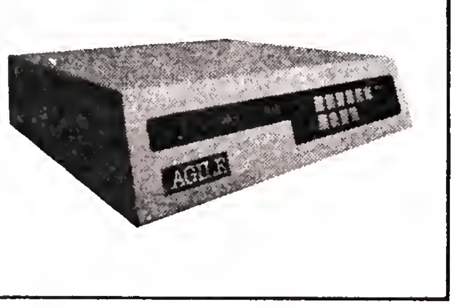

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& Associates, Inc.
3151 Airway Avenue, #C-2
Costa Mesa, CA 92626
Phone: (714) 957-0171
Telex: 5101002189 BJ JOHN

Continued from page 84

data bases.

The product is available for a permanent-license fee on the first CPU of $15,000.

. Financial Technologies International, One World Trade Center, New York, N.Y. 10048.

Application packages

Michaels, Ross & Cole Ltd. has announced **MRC-Retriever Release 7** for use with the IBM System/38.

MRC-Retriever enables nontechnical users to utilize relational data base inquiry capabilities. It is one module of six in the MRC-Query series. It allows users to build on-line inquiries into multiple files using any access path. New functions include a masking facility that allows data base scanning within fields and Help key documentation.

MRC-Retriever is priced at $1,440.

Michaels, Ross & Cole, P.O. Box 4533, Oak Brook, Ill. 60521.

■

System Support Products, Inc. has announced the **Deskworks/34-36 Spreadsheet** for the IBM System/34 and 36.

The program allows users of the Systems/34 and 36 to utilize the systems for spreadsheet processing. Features include spreadsheet sizes up to 999 columns by 9,999 rows.

Deskworks/34-36 will be available Jan. 1 for $295.

System Support Products, 7620 Arlen St., Annandale, Va. 22003.

■

CHI/COR Information Management, Inc. has announced the **CHI/COR Order Management System** and the **CHI/COR Accounts Receivable System** for the IBM 4300, 370, 3000 or compatible mainframes running DOS/VSE, OS/MVS or VM/SP.

CHI/COR Order Management includes file maintenance and inquiry, order entry, processing, billing, history, analysis and inventory control. The Accounts Receivable system can be used as a stand-alone or with the Order Management system. It features data entry, cash application options and management reports.

CHI/COR Order Management is priced at $90,000. CHI/COR Accounts Receivable is priced at $50,000. Customization is available.

CHI/COR Information Management, 10 Riverside Plaza, Chicago, Ill. 60606.

■

ABC Managment Systems, Inc. has ported its **ABC/MM Maintenance Management** package to the Digital Equipment Corp. VAX and Honeywell, Inc. DPS 6 systems.

ABC/MM is is a menu-driven online full-function Cobol system. It combines a common data base and eight integrated program modules. The modules accommodate labor records and time cards, work order scheduling to available capacity, job estimates, backlog planning and time and accounting performance control.

ABC/MM for the DEC VAX and Honeywell DPS 6 is priced between $10,000 and $65,000, depending on the configuration.

ABC Management Systems, Suite 3, 805 Dupont St., Bellingham, Wash. 98225.

Gateway Design Automation Corp. has unveiled **Aidssim-A**, a distributed processing version of its Aidssim concurrent fault simulation package for Apollo Computer, Inc.'s Domain workstation networks.

Aidssim-A can run a simulation that processes parallel activities on up to 10 networked workstations, the vendor claimed.

It is priced from $50,000.

Gateway Design Automation, P.O. Box 1545, 235 Great Road, Littleton, Mass. 01460.

Languages

Whitesmiths, Ltd. has released **Version 3** of its **Pascal to C Translator** for AT&T Unix running on the Digital Equipment Corp. VAX or AT&T 3B series.

The new version conforms to Level 1 of the International Standards Organization's standard. New features include a built-in file inclusion capability, relaxed rules for ordering declarations, a built-in string data type, an Otherwise clause in case statements and extended reset and rewrite statements for opening files by name.

Version 3 costs $1,000.

Whitesmiths, 97 Lowell Road, Concord, Mass. 01742.

■

Rexcom Systems Corp. has ported its **Rexcom** fourth-generation application development and management environment to Digital Equipment Corp. VAX/VMS systems.

Rexcom includes a high-level development language, an active integrated data dictionary and an multiuser transaction processing manager.

The basic Rexcom package is priced at $17,500 for VAX-11/725 and 730; $26,500 for the VAX-11/750; $34,500 for the VAX-11/780, 782 and 785; and $39,500 for the VAX 8600.

Rexcom Systems, Suite 400, 10333 Richmond Ave., Houston, Texas 77042.

■

Kuck & Associates, Inc. has announced the **Mini-KAP/AF** Fortran source vectorizer.

The Mini-KAP/AF accepts Fortran 77 and produces a listing that shows the vectorized Do loops in array-Fortran syntax. It uses data dependence and code analysis techniques to

Continued on page 86

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COMPUTERWORLD

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transform the program and discover array operations, according to the vendor.

The Mini-KAP/AF is available now for systems running the VMS operating system and will be available Jan. 1 for the University of California at Berkeley Unix 4.2 operating system. The product is priced at $5,000.

Kuck & Associates, Professional Commerce Center, 1808 Woodfield Drive, Savoy, Ill. 61874.

MICROCOMPUTERS

Software

MCBA, Inc. has announced **Accounts Payable**, **Accounts Receivable**, **Bill of Material Processor**, **Customer Order Processing**, **General Ledger**, **Inventory Management** and **Payroll**, seven accounting and distribution software packages written in RM/Cobol for the IBM Personal Computer AT running Microsoft Corp.'s Xenix operating system.

The packages include features such as the ability to use a variety of terminals and to access customers, vendors and inventory items by name, description or identification number.

Prices range from $1,000 to $2,500.

MCBA, 2441 Honolulu Ave., Montrose, Calif. 91020.

■

FTG Data Systems has introduced **Emu-Tek**, a software program that allows an IBM Personal Computer to function like a Tektronix, Inc. graphics terminal.

Emu-Tek comes in two versions. Emu-Tek Level 1 provides full Tektronix 4010 and 4012 emulation. It includes a screen copy facility that allows graphics screen images to be copied on paper using a dot matrix printer.

Emu-Tek Level 2 offers emulations of a Tektronix 4014, a Digital Equipment Corp. VT100 and a DEC Engineering VT640. Level 2 permits uploading and downloading of files. It has a redisplay feature and also includes a concurrent pen-plot capability.

Emu-Tek requires an IBM Personal Computer, Personal Computer XT, AT or compatible with a minimum of 256K bytes of memory, an asynchronous communications adapter and a graphics display adapter. IBM's PC-DOS or Microsoft Corp.'s MS-DOS 2 or later is necessary.

Level 1 costs $295. Level 2 costs $395.

FTG Data Systems, Suite M-2, P.O. Box 615, 10801 Dale St., Stanton, Calif. 90680.

■

Harvey Invisible Software has introduced **Prodisk Control**, a software program designed as an alternative way to invoke IBM PC-DOS or Microsoft Corp. MS-DOS commands.

Prodisk Control is a menu-driven program that is resident in random-access memory (RAM). It lets users create, save or change menus to run applications, perform PC-DOS or MS-DOS operations or select other menus with a keystroke.

Prodisk Control requires 196K bytes of RAM and PC-DOS or MS-DOS 2 or higher.

Prodisk is priced at $90.

Harvey Invisible Software, P.O. Box 1863, Cape Coral, Fla. 33910.

■

Computer Innovations, Inc. has announced **CI Probe**, a source-level debugger designed for use with the company's C86 C compiler for the IBM Personal Computer family.

CI Probe features full macros, the ability to single-step trace through both C and assembler codes, set breakpoints, view and/or alter C variables during execution and break into the program while debugging.

CI Probe is priced at $300.

Computer Innovations, 980 Shrewsbury Ave., Tinton Falls, N.J. 07724.

■

Seaside Software has released **Asksam Version 2.2**.

Asksam is a free-form, text-oriented data base management system that allows users freedom from fixed fields, fixed records and limited indexes. Version 2.2 offers a revised manual.

Asksam runs on the IBM Personal Computer and compatibles running IBM PC-DOS or Microsoft Corp. MS-DOS 2 or higher.

Asksam is priced at $149.95. Current users will receive the upgrade free of charge.

Seaside Software, 538 Parade Drive, Corpus Christi, Texas 78412.

Systems

On Time Systems has announced **Time Tracker**, a time and attendance system for IBM Personal Computers, Personal Computer XTs, ATs and compatibles.

The Time Tracker provides time and attendance software and comes with a Panasonic Industrial Co. electronic data collection time clock system.

It monitors each employee who clocks in and out and prints status reports by employee or by department. Available reports include absenteeism, late attendance and failure to clock in or out.

The Time Tracker is priced at $3,495.

Up to 16 time clocks can be added at a cost of $1,100 and up, depending on the quantity ordered.

On Time Systems, Suite D, 2565 E. Chapman Ave., Fullerton, Calif. 92631.

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West Germany
Eckhard Utpadel, CW Publikationens, Friedrichstrasse 31, 8000 Munich 40. Phone: (089) 38172-0. Telex: 5215350.

CPT Corp. has announced the **CPT Office Companion 2000**, a workstation that provides 16-bit Microsoft Corp. MS-DOS capability and interfaces to the CPT Office Dialog System and CPT Shared Resource System products.

The workstation works with the IBM Personal Computer and compatibles. It allows users to edit text and process DOS applications. The system includes 640K bytes of memory, one 3½-in. floppy disk drive with 720K-byte capacity and an RS-232 serial port.

The system costs $2,300.

CPT, 8100 Mitchell Road, Minneapolis, Minn. 55440.

■

Dekatek, Inc. has introduced **PC-Mailer**, an electronic scale mailing system and a United Parcel Service (UPS) manifesting system integrated into one.

PC-Mailer is IBM Personal Computer based and requires one 360K-byte disk drive, 128K bytes of random-access memory, an RS-232 serial port and Microsoft Corp. MS-DOS 2 or higher.

PC-Mailer includes domestic and international U.S. Postal Service, UPS and Federal Express rates. It can handle more than 1,000 transactions per day.

PC-Mailer costs $3,995.

Dekatek, Suite 211, 3401 Investment Blvd., Hayward, Calif. 94545.

Communications

E+E Data Comm announced the addition of the **Avatex 1200HC modem** and the **Avatex 2400 PC modem** to its Avatex line.

The Avatex 1200HC is AT&T 212A and 103 compatible. It offers diagnostics, automatic self-testing, remote testing and full Hayes Microcomputer Products, Inc. software compatibility.

The Avatex 2400 PC is a true half-card internally mounted 2,400 bit/sec. modem for IBM Personal Computers and compatibles. It is compatible with the Consultative Committee on International Telephony and Telegraphy standards and AT&T 212A and 103. It operates at 300, 1,200 and 2,400 bit/sec.

The 1200HC costs $299.95, and the 2400 PC costs $459.

E+E Data Comm, 2115 Ringwood Ave., San Jose, Calif. 95131.

■

Dialectron, Inc. has introduced the **Smart Answering Machine (SAM)**, a voice communications and telephone management system for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

The SAM package includes software, a half-size interface card and a modular phone extension cord.

It costs $295.

Dialectron, Suite 17, 2035 California St., Mountain View, Calif. 94040.

■

GTE Data Communication Products, a unit of GTE Communication Systems Corp., has announced **Trailblazer**, a 10K-bit/sec. asynchronous modem designed for personal computers.

Trailblazer operates over dial-up lines. It is available in a printed-circuit board version that fits into an IBM Personal Computer, Personal Computer XT, Personal Computer AT or compatible or in a stand-alone version. A communications software package is included with the board version.

The desktop unit costs $2,395, and the circuit board version costs $1,995.

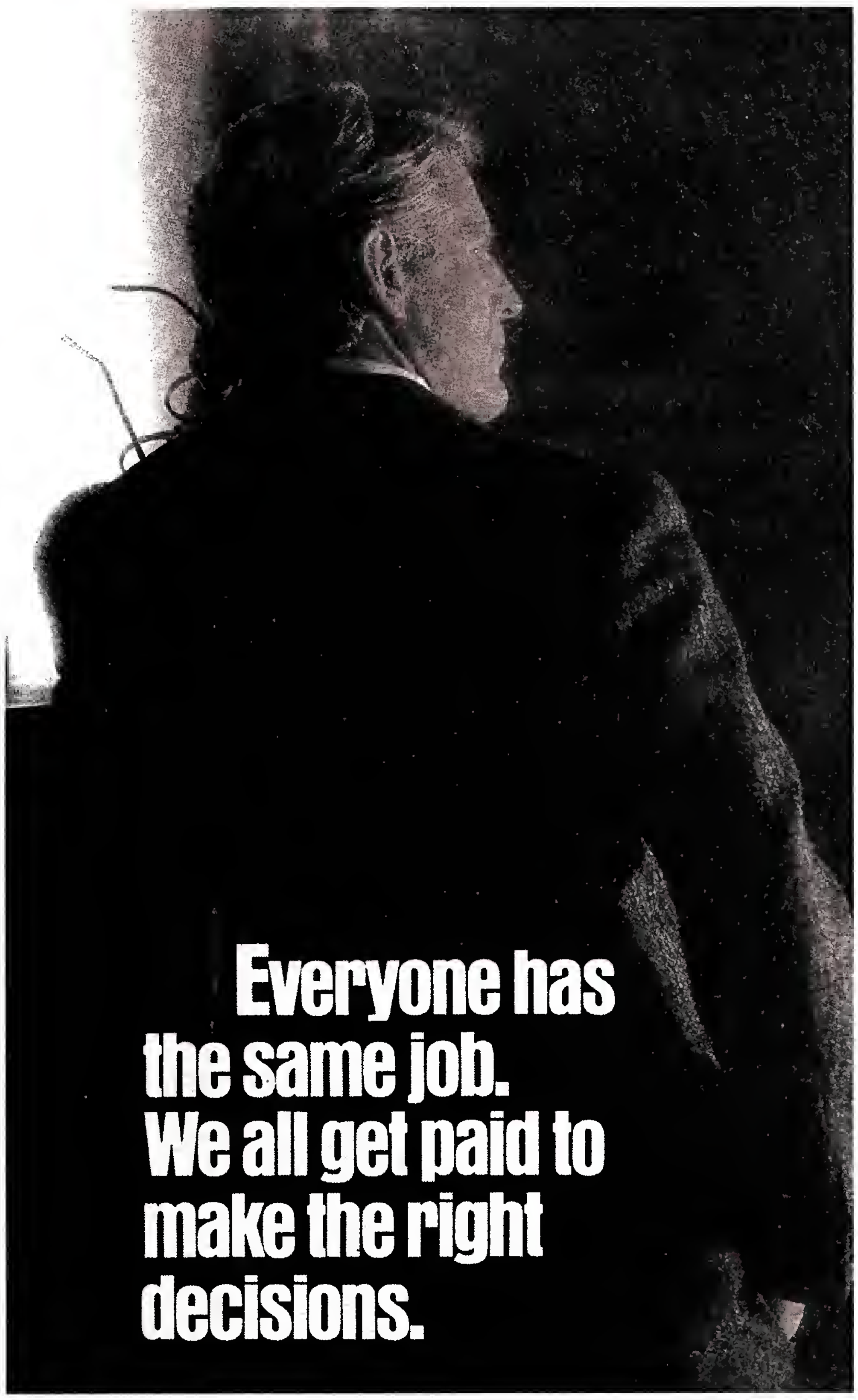
GTE Data Communication Products, Lakeside Plaza 2, 5225 Wiley Post Way, Salt Lake City, Utah 84116.

Storage

Sumo Systems has introduced a **mass storage subsystem** featuring a 10-, 20- or 33M-byte fixed drive and a 10M-byte removable cartridge disk drive for IBM Personal Computers and compatibles.

The subsystems are available in a single configuration with a fixed or removable disk drive or in a dual configuration with any combina-

Continued on page 88



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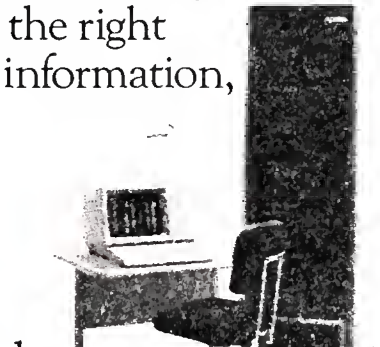

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Continued from page 87

tion of two fixed or removable drives, according to a company spokesman.

Each subsystem includes a standalone hard-disk cabinet and power supply, an IBM Personal Computer XT-compatible controller with shielded external connector, a shielded round interconnect cable and an installation guide. Both the fixed and the removable drives reportedly are also available for the IBM Personal Computer AT. All the subsystems require IBM PC-DOS or Microsoft Corp. MS-DOS 2 or higher, the vendor explained.

Prices range from $3,295 to $3,995, depending upon the configuration.

Sumo Systems, Suite C103, 1580 Old Oakland Road, San Jose, Calif. 95131.

Alpha Microsystems, Inc. has introduced the **Videotrax** videotape backup subsystem, a videotape-driven hard-disk backup for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

The product offers 80M bytes of interactive hard-disk backup. A circuit board mounted on a full-size expansion slot converts computer data into a video format, and vice versa, that any standard VHS or Beta videotape or videocassette recorder can read. The system runs on menu-driven Microsoft Corp. MS-DOS-compatible software.

The Videotrax subsystem including the controller board, software and a computer-controlled videotape drive is priced at $1,595. Without the videotape drive it is priced at $795.

Alpha Microsystems, P.O. Box 25059, Santa Ana, Calif. 92799.

Printers/plotters/peripherals

T.S. Microtech, Inc. has announced the **Dreamer**, a function keyboard for the IBM Personal Computer, Personal Computer XT, Apple Computer, Inc. Apple II+ and Apple IIe.

The Dreamer features a 20-key numeric keypad with independent cursor controls. It requires no memory-resident programs and no preboot disks.

The product has 30 keys preprogrammed with functions for Lotus Development Corp.'s 1-2-3, Visicalc and Micropro International Corp.'s Wordstar, according to T.S. Microtech.

The price of the Dreamer is listed as $259.

T.S. Microtech, 12565 Crenshaw Blvd., Hawthorne, Calif. 90250.

Shoshin U.S.A., Inc. has announced the addition of the **CP-804GV** single-pass, thermal-transfer color printer to its family of products.

The CP-804GV reproduces alphanumeric and graphic images on regular, Z-fold or roll paper as well as transparencies.

It is capable of printing up to seven colors in a single pass. Density is 101 dot/in., according to the vendor.

The printer interfaces with an IBM Personal Computer or compatible, red-green-blue video CRT display or a 640- by 400-pixel resolution image and prints the screen image dot for dot.

The price for one CP-804GV unit is $3,500.

Shoshin U.S.A., Suite 115, 1700 E. Garry Ave., Santa Ana, Calif. 92705.

■

Zenith Data Systems Corp. has introduced its **Z-39** VDT offering compatibility with a variety of terminals and microcomputers including the Zenith Z-200 and IBM Personal Computer AT and compatibles.

The Z-39 features a 12-in. diagonal green phosphor display and a 91-key keyboard that includes a 15-key numeric keypad. It is compatible with the ANSI 3.64; Digital Equipment Corp. VT-52 and VT-100; Lear Siegler, Inc. ADM 3A; and Zenith Z-19, Z-29 and Z-29A.

The Z-39 costs $749.

Zenith Data Systems, 1000 Milwaukee Ave., Glenview, Ill. 60025.

Board-level devices

STB Systems, Inc. has announced **EGA Plus**, a video adapter compatible with IBM's Enhanced Graphics Adapter.

The EGA Plus adapter operates in 16 different text and graphics modes. It saves expansion slots by providing 256K bytes of standard display memory and offers a parallel printer port. EGA Plus also features soft scrolling, panning and windowing.

The EGA Plus costs $595.

STB Systems, Suite 125, 601 N. Glenville Drive, Richardson, Texas 75081.

■

Dux is offering the **Dice** series of 8- and 16-bit emulators for hardware development.

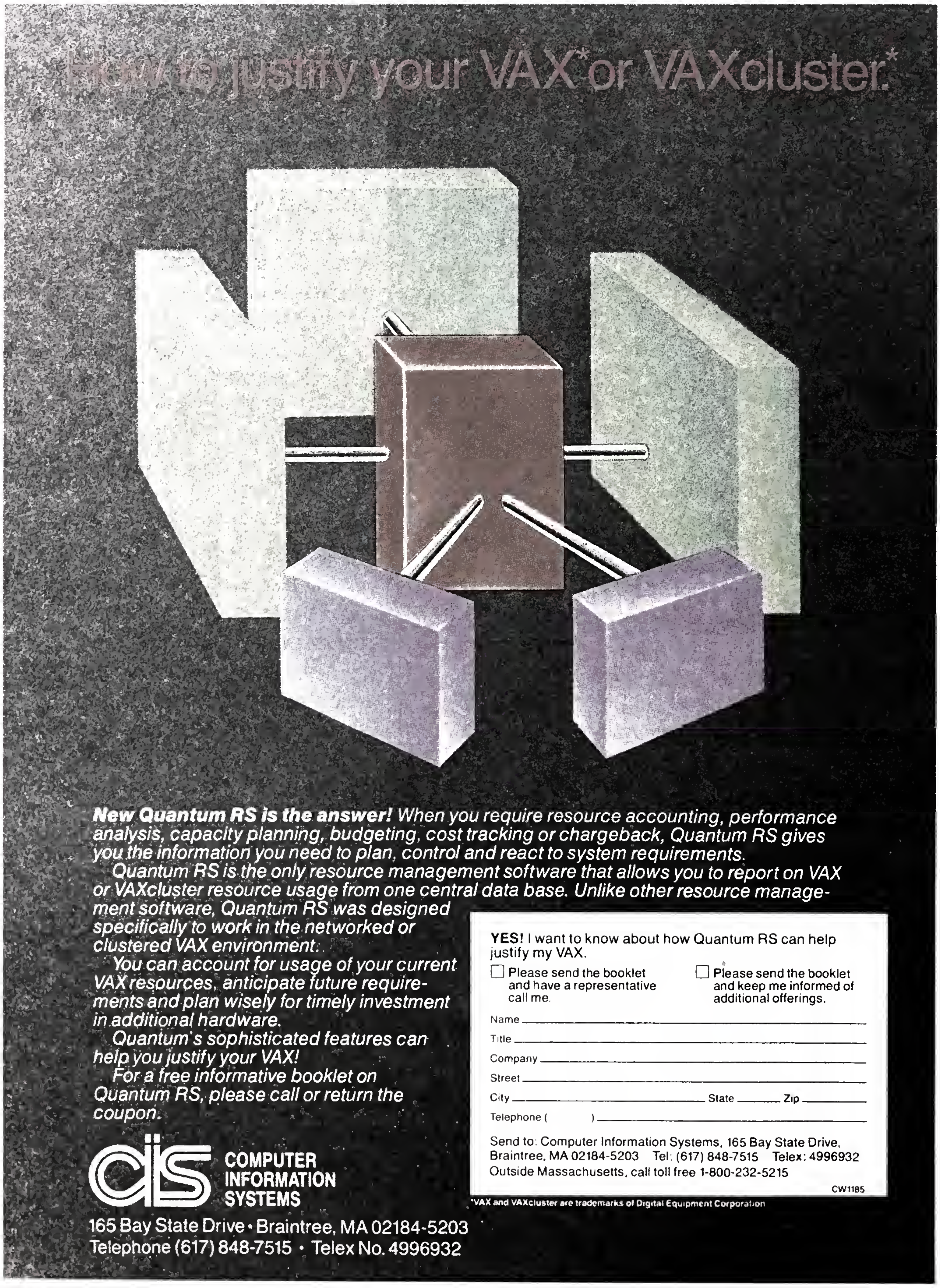
The Dice series supports 8- and 16-bit microprocessors. It can connect to most development systems and computers, including the IBM Personal Computer; Digital Equipment Corp. VAX, CP/M and PDP computers; Intel Corp. MDS/PDS; and AT&T Unix-based operating systems.

The emulators come standard with a maximum memory capacity for 8-bit microprocessors using high-speed static random-access memory; 16-bit emulators include 128K bytes of memory, expandable to 384K bytes. Other features include a real-time trace-history display, break points and logic analyzer capability.

Two RS-232 ports, one with automatic bit/sec. rate selection, allow Dice units to operate in transparent mode for connecting and downloading code and symbol tables from the host development system.

Prices range from $4,595 to $7,795.

Dux, 1850 E. 17th St., Santa Ana, Calif. 92701.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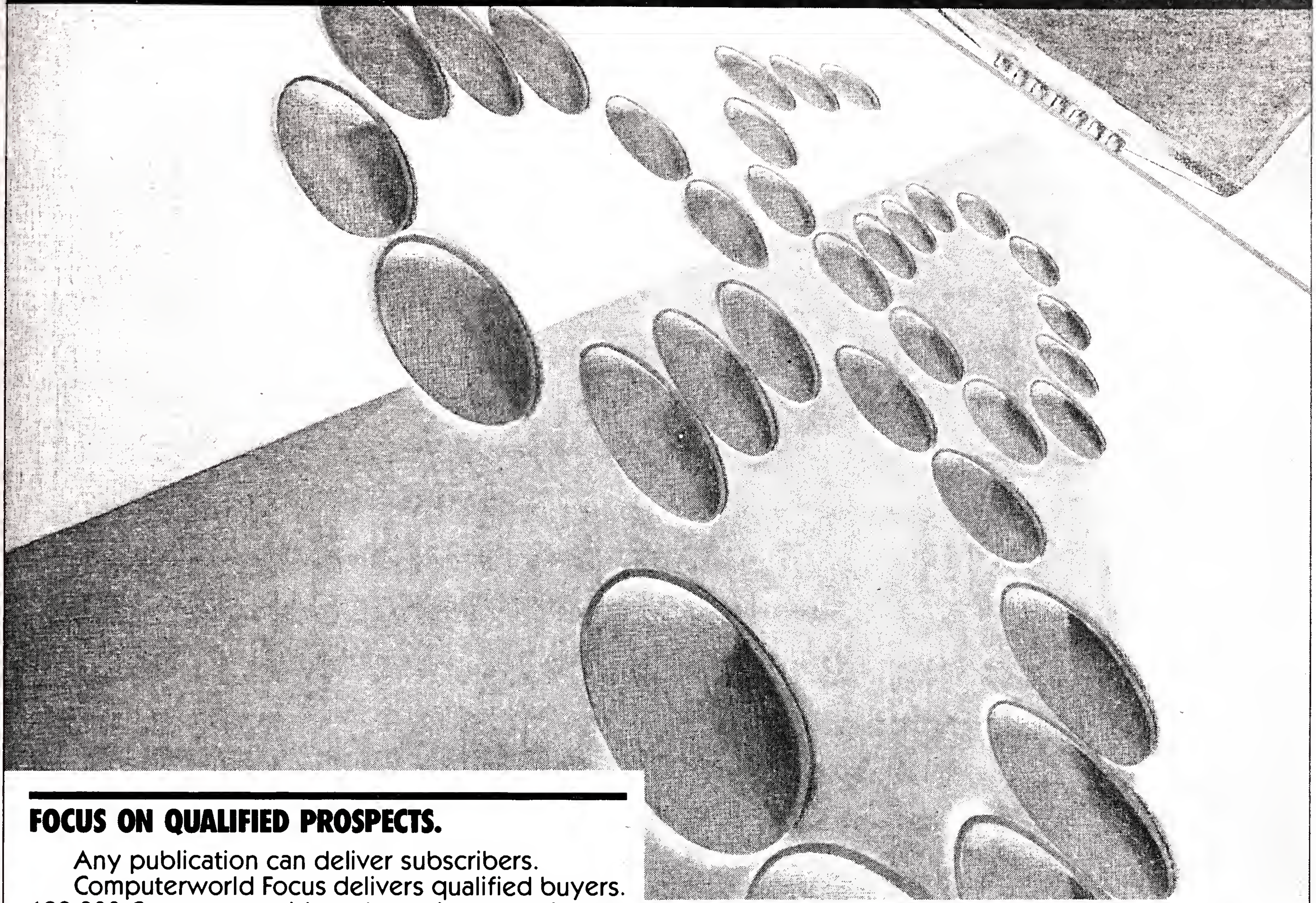

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IN JANUARY OUR FOCUS IS COMMUNICATIONS.

Our first issue of the new year is Communications, with bonus distribution at Comnet in January. We'll cut through all the hype and get firsthand information from actual users. MIS/DP directors will learn what to expect — and what not to expect — of networks, packet switching, LANs, and voice and data PBXs. Which makes our January issue absolute must-reading for every MIS/DP director.

For more information, contact Ed Marecki, Vice President/Sales, Computerworld Focus, 375 Cochituate Road, Framingham, MA 01701. Or call (617) 879-0700.

But hurry, the closing for the January 15th Communications issue is December 6th.

Computerworld Focus Topic	Issue Date	Closing Date*	Show Distribution
Communications	January 15**	December 6	Comnet
Software	February 19	January 10	
Manufacturing	March 19	February 7	Advanced Manufacturing
Microcomputing	April 16	March 7	Comdex/Spring '86
Office Automation	May 14	April 4	NCGA, NCC
Software	July 9**	May 30	PC Expo, Software Expo
Unix™	August 20**	July 11	Unix™ Expo
Communications	September 17	August 8	TCA
Office Automation	October 8	August 29	Info '86
Microcomputing	November 12	October 3	Comdex/Fall '86

* Premium positions close one week prior to the published closing dates above.
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San Francisco: (415) 421-7330; **Los Angeles:** (714) 261-1230.

COMMUNICATIONS

Voice/data communications

Phalo Corp.'s Optical Systems Division has announced a **Voice Channel Option** for its 9.6K bit/sec. series asynchronous/synchronous multiplexers.

The Voice Channel Option provides voice transmission capability. It enables private branch exchanges to telephone communication with fiber-optic point-to-point multiplexing.

The Voice Channel Option consists of one PBX module, one station module and a ring generator located at the station multiplexer. The price of the total system is $8,695.

Phalo, Optical Systems Division, 65 Moreland Road, Simi Valley, Calif. 93065.

Protocol converters

Signal Solver, a bidirectional interface converter for converting data between RS-232 serial format and parallel format is available from **Devoke Data Products.**

With Signal Solver, users can interface incompatible computer equipment. For example, the converter would allow a parallel printer to be connected to the serial port of a host computer, the vendor said.

Signal Solver costs $139.95.

Devoke Data Products, 1500 Martin Ave., Santa Clara, Calif. 95050.

■

Telebyte Technology, Inc. has unwrapped **Model 63-2**, an RS-232-to-RS-422 converter.

It supports full-duplex transmission from an RS-232 port and provides conversion circuitry to accommodate the differential I/O required by RS-422. It can transmit data over 4,000 ft of twisted-pair wiring at 38.4K bit/sec.

Transmission cabling connecting the RS-422 ports can exhibit different impedances.

Model 63-2 sells for $110 in single quantities or $88 each in quantities of 100.

Telebyte Technology, 270 E. Pulaski Road, Greenlawn, N.Y. 11740.

Software

Systems Strategies, Inc. has announced **MSNA/3270**, an IBM Systems Network Architecture (SNA) emulation software package.

MSNA/3270 allows an Intel Corp. Multibus-based host to connect to an IBM mainframe by emulating a remote 3274 cluster controller. Terminals and printers connected to the host can exchange data with the IBM mainframe as if they were IBM 3278 terminals and 3287 printers.

MSNA/3270 runs on Multibus communications processor boards. It comes in configurations using standard Intel IRMX, AT&T Unix or Microsoft Corp. Xenix operating systems. Prices, depending on quantity, range from $200 to $5,000.

Systems Strategies, 225 W. 34th St., New York, N.Y. 10001.

■

Intel Corp. has announced **MAP-Net**, a software module that conforms to the specifications for the upper three layers of General Motor Corp.'s Manufacturing Automation Protocol (MAP) local-area network.

MAP-Net completes Intel's board-level product family that implements all seven layers of the MAP networking model for Multibus systems. MAP-Net is preconfigured for the Intel ISXM 554 Multibus MAP board.

MAP-Net will be available in April. It is priced at $2,000 for an eight-user development license.

Intel, 2402 W. Beardsley Road, Phoenix, Ariz. 85027.

■

Teleplan, a communications planning package for traffic engineers and network designers that runs on IBM Personal Computers, Personal Computer XTs, ATs and compatible processors, is available from **Systems & Software Development, Inc.**

With Teleplan, users can calculate Grade of Service; the minimum number of trunks needed for a given Grade of Service and data communications queue and line performance.

It costs $195 and requires 128K bytes of random-access memory.

Systems Software & Development, Suite 302, 7633 E. 63rd Place, Tulsa, Okla. 74133.

Multiplexers/modems

Astrocom Corp. has introduced the **ATDM**, a six-port time-division multiplexer.

The microprocessor-based ATDM can multiplex data from up to six synchronous devices onto a single 56K-byte transmission link. It is designed to work with either AT&T Dataphone Digital Service or private circuits.

It supports eight selectable speed formats for the six user ports. The ATDM costs $1,395.

Astrocom, 120 W. Plato Blvd., St. Paul, Minn. 55107.

■

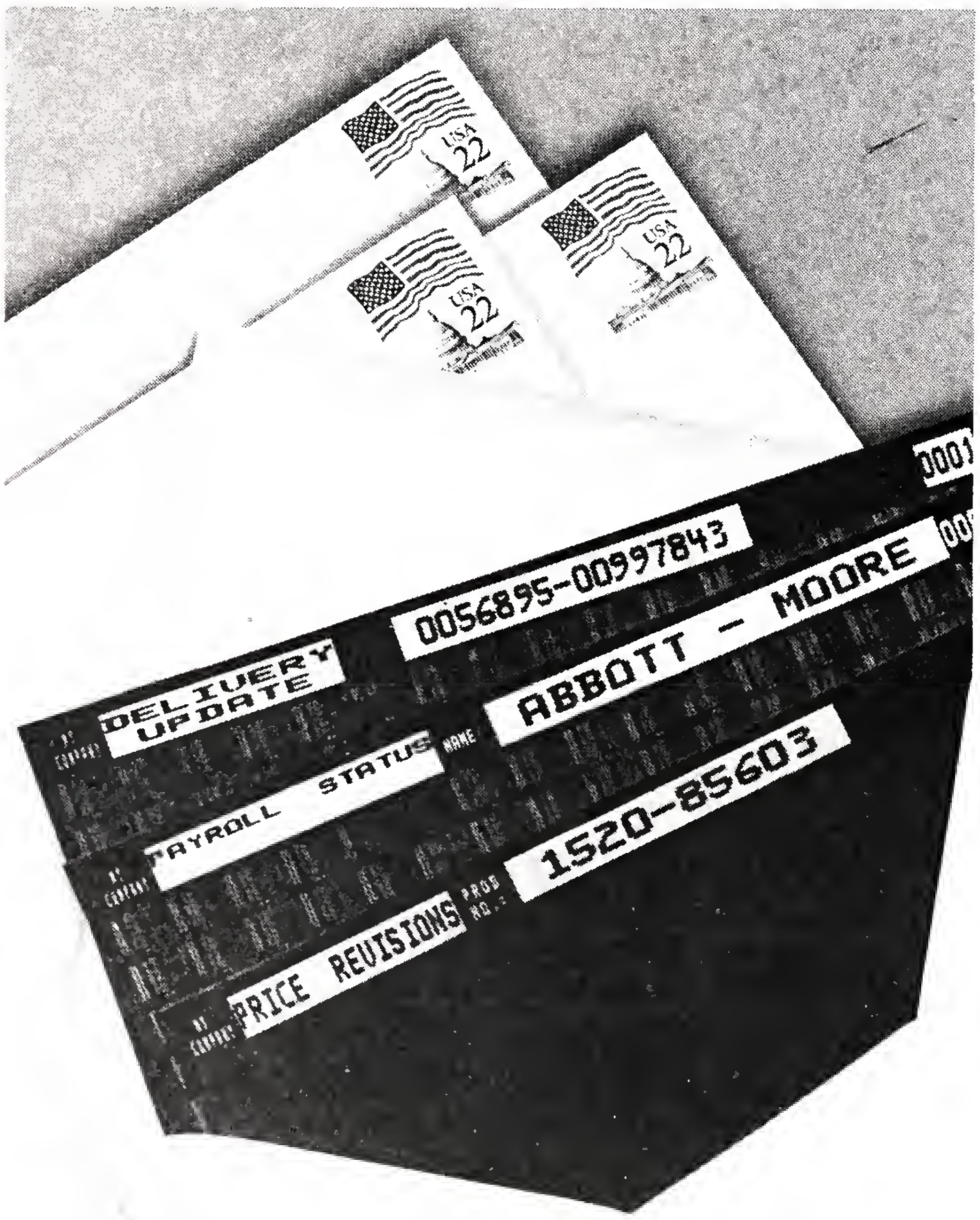
Raycom Systems, Inc. has announced **Models 2600, 2601 and 2602**, three fiber-optic modems that transmit data at T1 speed over 2.5-, 5- or 16-km fiber-optic links.

Models 2600 and 2601 are for installations of 2.5-km or 5-km links, respectively, using multimode fiber-optic cable and transmitting at 820 nanometers. Model 2602, the 16-km version, transmits at 1,300 nanometers.

Pricing for the 2600, the 2601 and the 2602 is $900, $1,400 and $7,500, respectively.

Raycom Systems, 6395 Gunpark Drive, Boulder, Colo. 80301.

HOW TO MAIL A 270-PAGE REPORT TO FOUR OF YOUR OFFICES...FOR A BUCK.



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One new terminal offers exceptional reliability through advanced technology.

The new TeleVideo 955.

This begins a new generation of superior quality machines from the world's number one independent terminal maker.

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This is the only terminal with upgrade flexibility built in. And its comfortable new keyboard has earned twice the reliability rating of earlier models.

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Advanced technology is also responsible for a high contrast, 14 inch, tilt and swivel screen (amber optional) that's dramatically easier to read than the ordinary CRT.

The new TeleVideo is $699.

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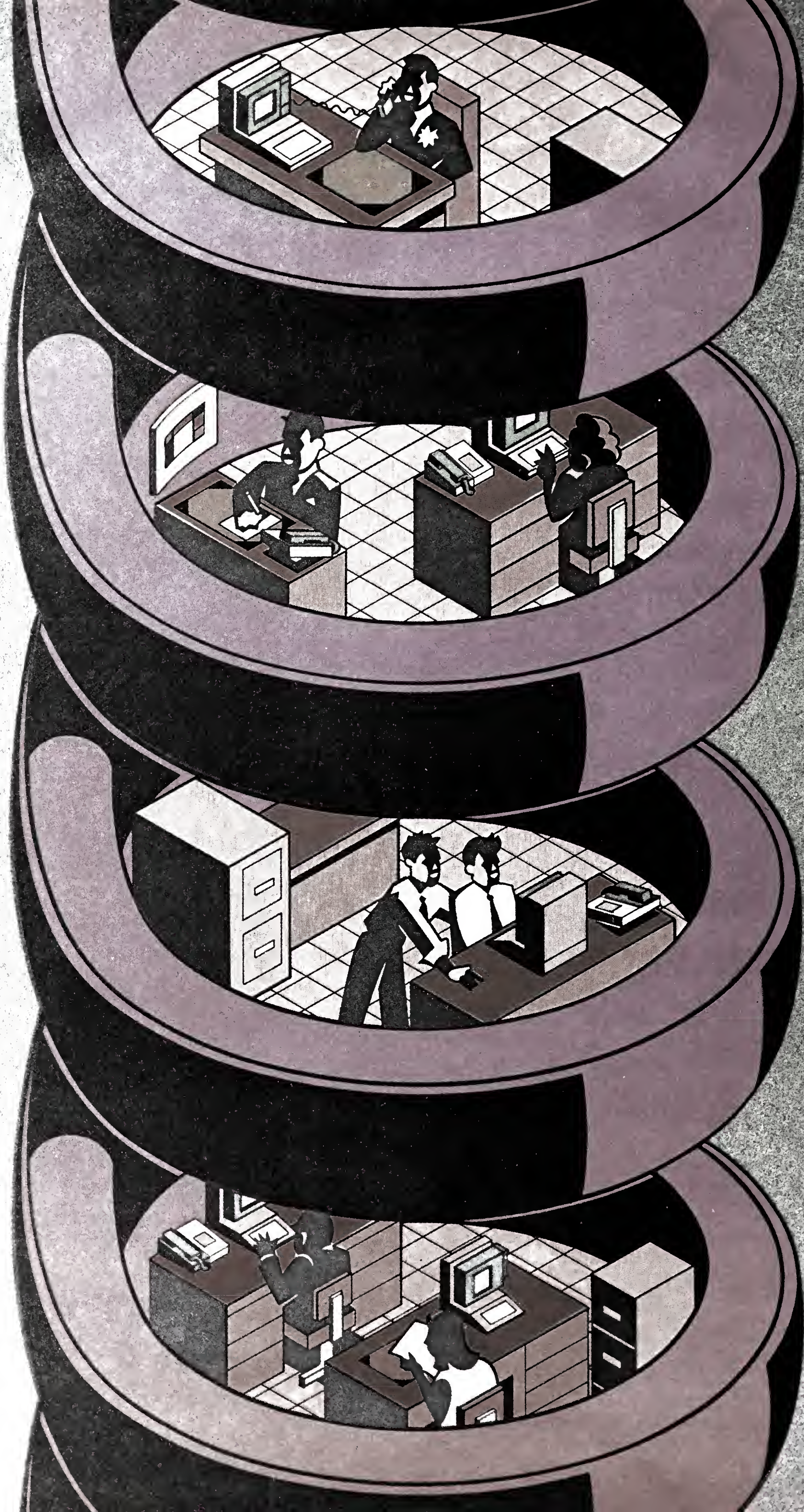

THE BEST WAY TO KEEP YOUR COMMUNICATIONS FROM BEING TIED UP IS TO TIE THEM TOGETHER.

NETWORKING LINKS ALL YOUR VOICE AND DATA TERMINALS, WHEREVER THEY MAY BE. IT'S ONE OF MANY INTEGRATED FUNCTIONS OF AT&T SYSTEM 85 AND AT&T SYSTEM 75.

Everyone knows the old adage, "there's strength in numbers." That holds true only if the various elements, however numerous, are working together.

The Networking function of System 85 and System 75 from AT&T Information Systems unites all the elements of our business communications systems so everything works together. Whether you have offices spread throughout a building or throughout the country, they can all be linked productively into one network.

A NEW BUSINESS ASSET

A network should be looked at not simply as a communications tool, but as a business asset. Like any other asset your business holds, it too can be controlled and managed and made to work for you.

All our networks let you incorporate new applications, making your system more powerful than ever. And thanks to our integrated digital T-carrier interface, you can speed up and control the flow of not only voice, but data transmissions as well.

In a small area, like a campus, or even nationwide, look into our Distributed Communications System. With it, multiple systems serving up to 100,000 lines can function as one. It also offers extensive voice and data terminal transparency and attendant transparency, so attendants can control the entire system from one location.

Remote Groups let you extend System 85 capabilities to small locations via DS-1 facilities. Remote Modules serve larger locations, up to 2½ miles away, over fiber optics. Voice communications and data from host computers are transmitted with complete user transparency.

An Electronic Tandem Network can also be used to link locations anywhere in the country. Through a mix of analog, high-capacity digital, and public facilities, virtually any number of voice and data terminals can be connected.

CONTROL AND ECONOMY

Once you've linked your communications into one network, you'll have a host of powerful features working to increase productivity, reduce costs and give you more control over your communications. Automatic Route Selection, Automatic Alternate Routing, and Queuing choose the least expensive path for all network calls. And "Authorization Codes" grant calling privileges to appropriate employees.

With all your offices under the umbrella of one system, networking can help create another business asset—a single, consistent corporate identity for every branch of your organization.

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System 85 and System 75 are designed according to the guidelines of Information Systems Architecture. This ensures that any upgrades or future generations of the system will be compatible with the current one. So your investment is protected.

There are over 350 ETN's and DCS's already in place. More than half of the *Fortune 500* companies have chosen private networks from AT&T Information Systems. Besides our features, function and investment protection, there's one more compelling reason why—our service.

Our systems are backed by the largest sales and service staff in the industry. Network support includes predesign, cutover coordination, post-cutover administration, and ongoing maintenance. Add to that a century of communications experience and leadership, and your decision is easy. Of all your alternatives, only one is the right choice—AT&T.

To find out more about the Networking capabilities of System 85 and System 75, call your AT&T Information Systems Account Executive or 1-800-247-1212.

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NEW PRODUCTS/COMMUNICATIONS

Telenetics Corp. announced the **Ponyexpress** modem at Comdex/Fall '85.

Ponyexpress is an external minimodem housed in a case that measures 5 in. wide by 6 in. deep and 1½ in. high. It includes a power supply, all circuitry, switches, indicators, direct connect circuitry and an RS-232C interface.

Model 12A has a 1,200/300 bit/sec. data transfer rate, and Model 24A communicates at 2,400, 1,200 and 300 bit/sec. Model 12A costs $395, and Model 24A costs $495, the company said.

Telenetics, 895 E. Yorba Linda Blvd., Placentia, Calif. 92670.

■

Codex Corp. has announced the **Codex 2200** series of AT&T-compatible modems.

The series is made up of three modems: the Codex 2215, 2216 and 2217. The 2215 and 2217 are two-wire, half-duplex synchronous dial modems that operate at 1,200 and 2,400 bit/sec., respectively. The Codex 2216 is a four-wire, full-duplex asynchronous leased-line modem that operates at 1,200 bit/sec.

The Codex 2215 features both pulse and tone dialing. The 2216 features antistreaming.

Single-unit prices for the Codex 2215, 2216 and 2217 are $495, $425 and $685, respectively.

Codex, 20 Cabot Blvd., Mansfield, Mass. 02048.

■

Microcom, Inc. has announced the **AX** family of five modems for use over two-wire dial-up lines.

Each product also represents the announcement of three new classes of Microcom Networking Protocol (MNP) technology. The AX/1200 and AX/2400 are MNP Class 4 modems.

The AX/2400C is an MNP Class 5 modem. According to the vendor, it compresses transmissions so that typical throughput on text files is 4.8K bit/sec.

The MNP Class 6 products are AX/9612C and AX/9624C modems. Both operate at 9.6K bit/sec. They offer statistical duplexing and universal link negotiation.

The AX/1200 and AX/2400 cost $499 and $749, respectively. The AX/2400C costs $899. The AX/9612C and the AX/9624C cost $1,599 and $1,799, respectively.

Microcom, 1400A Providence Highway, Norwood, Mass. 02062.

Half-Pak 12, a 1,200 bit/sec. half-card internal modem for IBM Personal Computers, Personal Computer XTs, ATs or compatibles, is available from **CTS Fabri-Tek, Inc.**

The Hayes Microcomputer Products, Inc.-compatible modem can also work with AT&T 212A and AT&T 103/113 data sets. It operates asynchronously at 1,200, 300 and 110 bit/sec. speeds. Features include autodial, autoanswer, on-board speaker, call-progress monitoring plus remote and local diagnostics.

Half-Pak 12 costs $395.

CTS Fabri-Tek, 6900 Shady Oak Road, Eden Prairie, Minn. 55344.

■

Able Computer Co. has announced a **host interface board** that allows its Mux Master multiplexer to operate with Digital Equipment Corp. Microvax II processors.

The quad-size Q-bus host board installs in the Microvax II and is joined by a distribution panel for up to eight Mux Master cluster controllers located along a twisted-pair link. Each controller can handle between eight and 16 terminals.

Priced at $4,800, a typical package consists of the Q-bus host board, one 16-line cluster controller, a power supply, the distribution panel and a 25-ft composite link. The eight-line controller costs $2,000; the 16-line controller sells for $3,200.

Able Computer, 3080 Airway Ave., Costa Mesa, Calif. 92626.

Auxiliary equipment

Teleprocessing Products, Inc. has introduced the **TP-1544**, a T1 customer service unit for 1.544M bit/sec. services.

The device is compatible with all T1 communications equipment to 1.544M bit/sec. It has an integral loop-back generator. The unit permits connection of T1 equipment as much as 6,000 feet from the T1 customer service unit. It has both line and station powering, allowing 64K bit/sec. clear-channel operation.

The TP-1544 costs $1,195.

Teleprocessing Products, Building 7K, 4565 E. Industrial St., Simi Valley, Calif. 93063.

■

Wall Industries, Inc. has added **Model TS5** two- and four-position coaxial switches as well as the **Model TS6-1** dual coaxial switch and the **Model TS7-1** twin axial switch to its product line.

The switches enable users to share computers or peripheral devices without having to connect and disconnect cables for each change.

Pricing for Models TS5 two-position, TS5 four-position, TS6-1 and TS7-1 switches is $102.95, $129.95, $127.95 and $149.95, respectively.

Wall Industries, 2 Franklin St., Lawrence, Mass. 01840.

■

Com II, a communications board with two serial channels that can transmit and receive data at up to 3M bit/sec. has bowed from **SBE, Inc.**

The Motorola, Inc. 68000-based Multibus-compatible single-board computer includes a four-channel direct memory access controller that provides full-duplex operation on

Continued on page 96

Important Announcement for All U.S. Computer Products Manufacturers!

The Japanese computer buyer is targeting U.S.-made products!

Japan, the world's largest computer market outside of the U.S., will eliminate all import tariffs on computers, peripherals and parts early next year. The Japanese Prime Minister and government trade ministries have instructed Japanese companies to substantially increase their purchasing of U.S. goods to lower the Japan-U.S. trade deficit.

And, you can reach the MIS/DP directors and key technical staff at virtually all the major computer-using sites in Japan, when you advertise your products in Computerworld Japan—Japan's leading computer news publication. Computerworld Japan's readers account for over 75% of the Japanese end-user computer market.

Modeled after its' sister publication in the U.S., Computerworld, Computerworld Japan covers the latest developments in the Japanese computer industry. Each week, over 35,000 readers turn to Computerworld Japan for information on new products and services, current applications, industry trends and international events.

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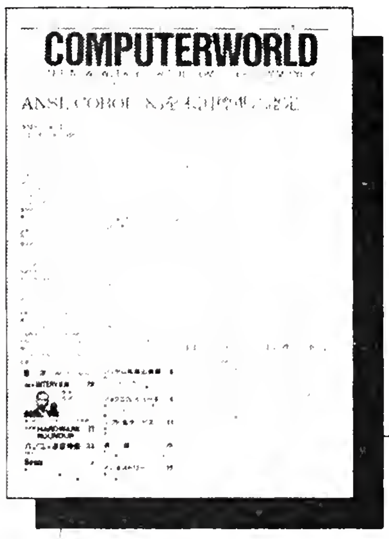

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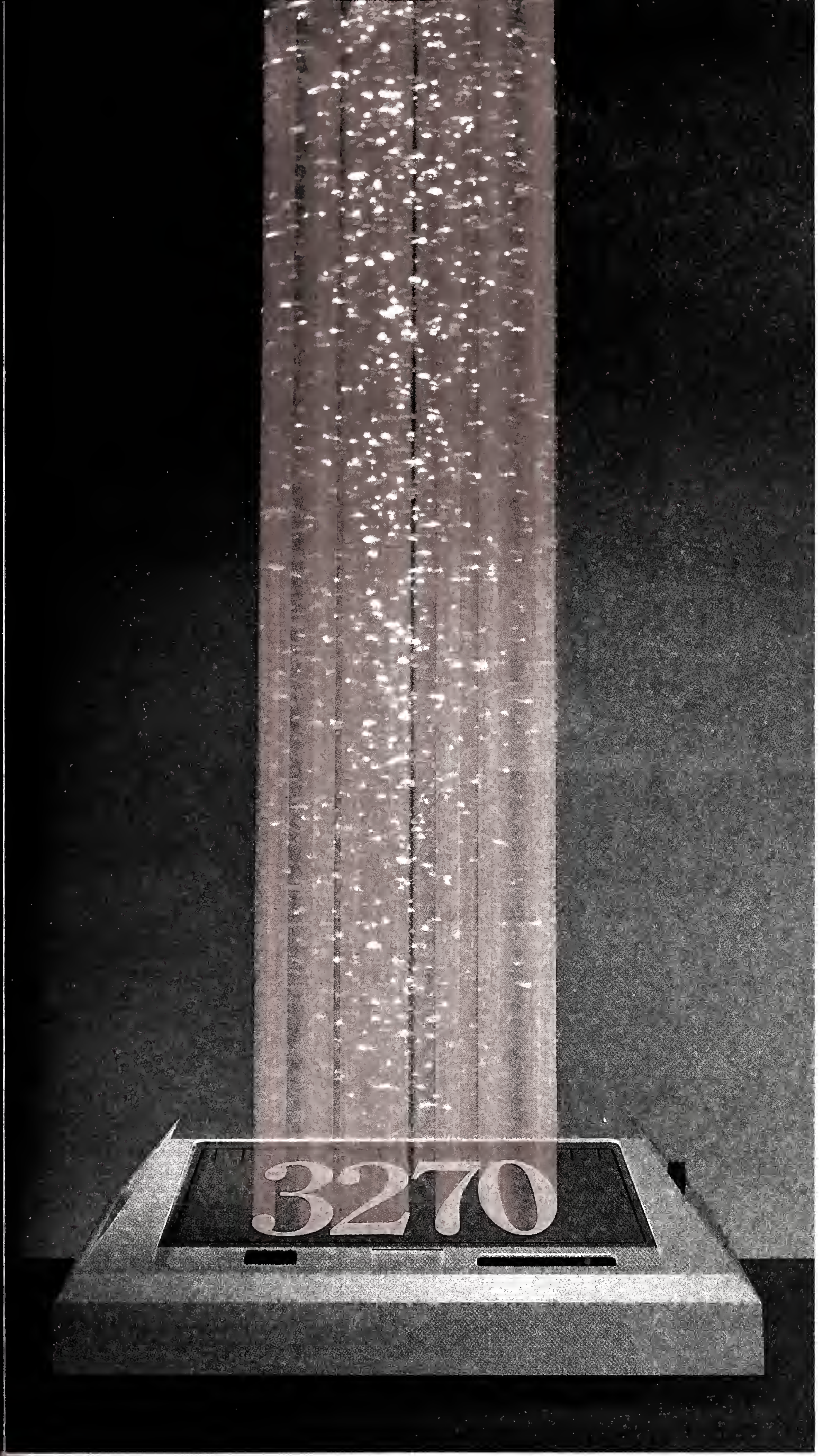

More And More Printers Are Seeing The Light.

Every day, more and more IBM 3270 users are saving money and increasing productivity by attaching ASCII printers instead of IBM 3287s to their networks.

And one company is providing these users with more protocol converters than all others combined.

Avatar.

The reason is simple. The Avatar PA1500 goes well beyond simple 3287 emulation. It opens the entire spectrum of ASCII printers to the 3270 user, because it can be used with laser printers, ink jet printers, line printers, other dot matrix printers and plotters – virtually *any* ASCII printing device.

The PA1500 is also easy to install, requiring nothing more than a simple coax connection to IBM 3274/3276 controllers. And, because it provides all the important front panel controls of the 3287, it's easier to use than other converters.

If there are 3270 systems in your company still operating in the dark, help them see the light. Call us now at (617) 435-6872.

Avatar manufactures a complete line of protocol converters for terminals, personal computers and printers, micro-to-mainframe links, network gateways and other data communications products.

Avatar enlightens printers made by Anadex, Centronics, Dataproducts, Datasouth, Diablo/Qume, Digital Equipment Corporation, Epson, Florida Data, Gemini, Genicom, Hewlett Packard, NEC, Okidata, Printronix, Texas Instruments, and others.

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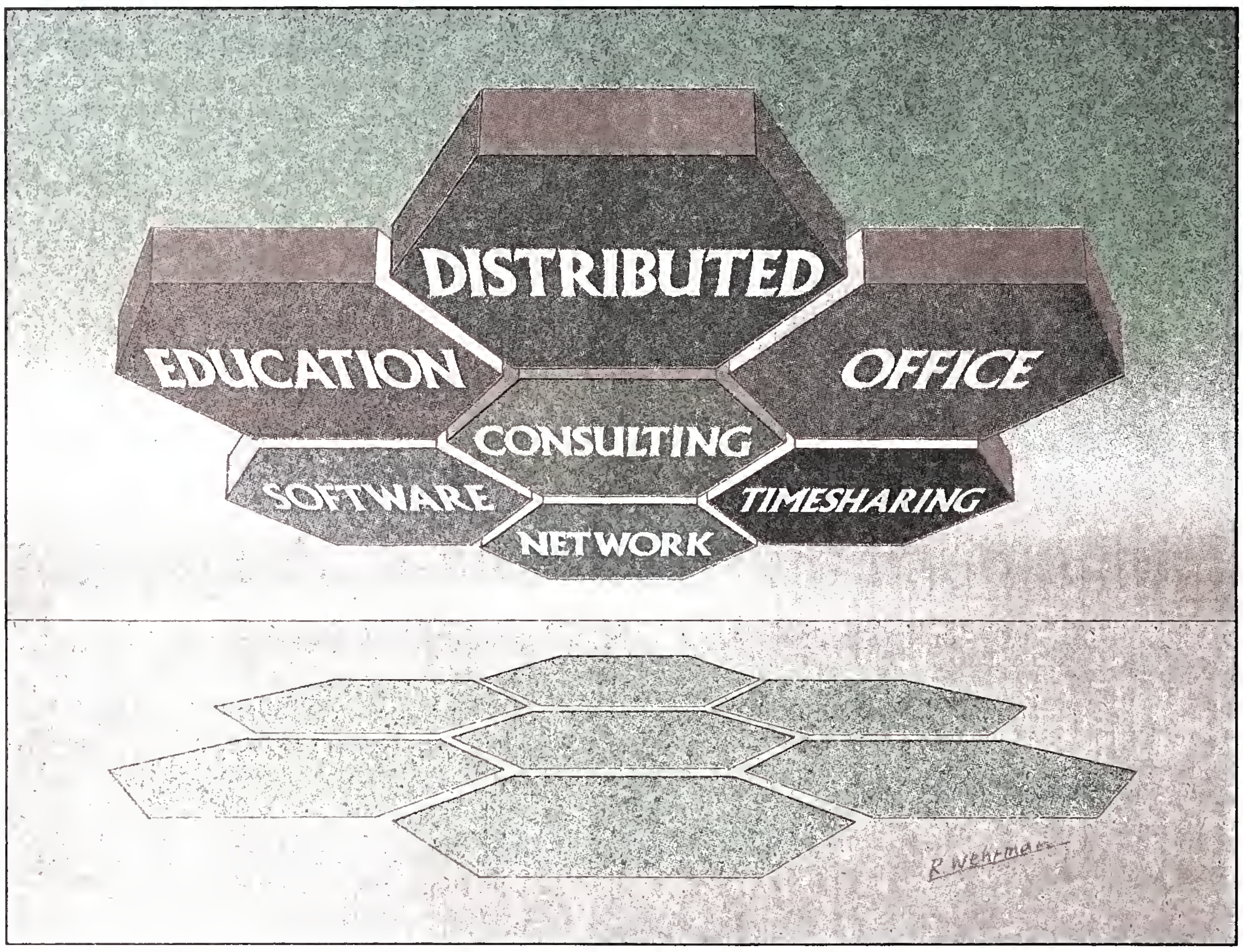

Meeting information needs has become a major international concern. One in which maintaining compatibility and unity is a difficult task. That's why Boeing Computer Services offers a unique combination of integrated information services to government and industry. To help you obtain precisely the systems, services, and software you need.

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Continued from page 94

both serial ports, according to the vendor.

A standard Com II has 128K or 512K bytes of dual-ported hardware.

Com II costs $1,295 in quantities of 100.

SBE, 2400 Bisso Lane, Concord, Calif. 94520.

SYSTEMS AND PERIPHERALS

Turnkey systems

Infomed Corp. has announced the **Medical Data Collection Workstation** for industrial, clinical/medical screening and analysis.

The product provides medical practitioners in occupational health facilities with pulmonary diagnostic measurements and reports. Each workstation comprises a series of modules configured to suit users' needs. The Infomed pulmonary data collection software provides diagnostic information.

The basic system consists of an Intel Corp. 16-byte microprocessor with 256K bytes of random-access memory, one 5¼-in. floppy disk drive, one 10M-byte hard disk drive, a graphics module and a 12-in. monochrome screen. It costs $9,995.

Infomed, 13 Inverness Way S., Englewood, Colo. 80112.

■

Agena Corp. has introduced **Agena/Microvax II**, a multiuser computer system for independent insurance agencies, based on **Digital Equipment Corp.'s Microvax II.**

The system offers policy information, accounting, automatic pending, a versatile and fully integrated marketing program, word processing, claims history and communications. The basic Agena/Microvax II configuration will support 15 workstations and is expandable.

Prices start at $50,000.

Agena, 9707 Third Ave. N.E., Seattle, Wash. 98115.

■

The **Prosource Medical Management System** has bowed from **Professional Computer Technologies, Inc.**

The system, consisting of software, a transporter computer board, a Texas Instruments, Inc. TI-860 wide-carriage printer and IBM monochrome monitor, enables the IBM Personal Computer AT to run minicomputer software for medical applications with no modifications.

Prosource Medical Management System costs $14,995 or can be leased for less than $400 per month over five years.

Professional Computer Technologies, 4255 Balloon Park Road N.E., Albuquerque, N.M. 87109.

Processors

Force Computers, Inc. has announced the **CPU-5**, a Motorola, Inc. 68000-based CPU for VMEbus.

The CPU-5 card uses a 12.5- or 16.7-MHz 68000 16-bit microprocessor and 128K bytes of zero-wait-state static random-access memory. It also offers two multiprotocol serial I/O channels, 256K-byte erasable programmable read-only memory capacity, a single-level VMEbus arbiter, a parallel interface/timer and a full VMEbus interface.

Single-quantity pricing for the CPU-5 starts at $2,495.

Force Computers, 727 University Ave., Los Gatos, Calif. 95030.

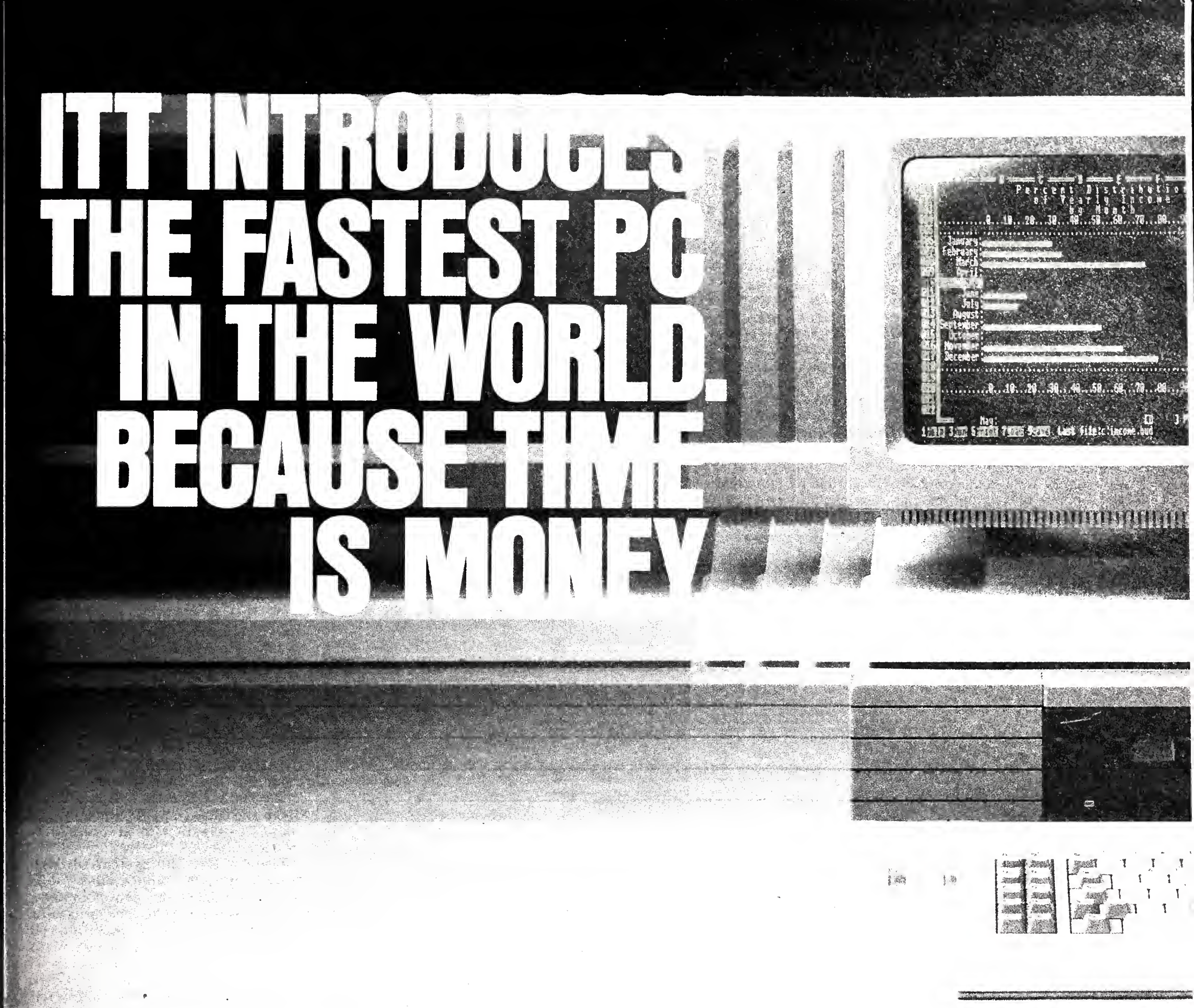
■

Plexus Computers, Inc. has announced a job processor field-upgrade kit for its **P/35** and **P/60** AT&T Unix-based computer systems.

The kit will upgrade the system's job processor from a Motorola, Inc. 68000 to a 68020, thereby increasing processing speed. The kit also contains an 8K-byte memory cache and optional floating-point support based on the Motorola 68881 coprocessor.

The 68020-based board will be available for field upgrade in the

Continued on page 98



ITT INTRODUCES THE FASTEST PC IN THE WORLD. BECAUSE TIME IS MONEY.

The new ITT XTRA XP is definitely out to break some speed limits and sound barriers.

Thanks, in part, to the added muscle of an Intel 80286 chip buried deep inside, the ITT XTRA XP runs circles around the competition.

It is, in fact, over three and a half times faster than the IBM XT.

And twenty-five percent faster than the AT on a Lotus recomputation.

And as if speed alone weren't enough, the new XP actually speaks. And listens.

Using our optional Voice Communications Module, you can duplicate keystrokes with just your voice.

Leaving your hands free to go about their business.

You'll also find an extremely economical 3270 emulation option.

And our optional Integrated Graphics Adapter that displays virtually any program on the market—color or monochrome—on one monitor.

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ITT listens, too.

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Call today. Time is definitely money.

And time is something the XP can save you a lot of.

ITT
PERSONAL COMPUTERS

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Continued from page 96

first quarter of 1986, priced at $8,000 with a $1,000 discount for the return of the old board. The 68881 floating-point coprocessor costs $1,500.

Plexus, 3833 N. First St., San Jose, Calif. 95134.

Data storage

Dataram Corp. has announced an increase in the storage capacity of its **Wide Word** bulk memory system to 160M bytes.

The increased capacity makes possible longer collection times for data acquisition systems, storage of larger data sets for simulation problems or more common memory for distributed processing configurations. The higher memory will also assist in lowering power consumption, according to the vendor.

A complete 160M-byte Wide Word system costs $253,870.

Dataram, Princeton Road, Cranbury, N.J. 08512.

■

Pertec Peripherals Corp. introduced four disk and tape storage products, the **DX548**, **DX368**, **DP Series Data Package** and **FS2000**, at the Comdex/Fall '85 show last week.

Two products, the DX548 and the DX368, are 8-in. Winchester disk drives that have capacities of 548M bytes and 368M bytes, respectively.

The DP Series Data Package incorporates one or two Pertec Peripherals DX series 8-in. Winchester disk drives and a power supply. It is configured in capacities from 199M bytes up to 1.1G bytes, and access to data is 18, 20 or 22 msec at a data transfer rate of 9.67 to 14.52 MHz, depending on the configuration.

The FS2000 is a quad-density, automatic-loading ½-in. streaming tape drive that provides data capacities from 23M to 270M bytes.

In quantities of 250, the DX548 costs $5,300, the DX368 costs $4,300, and the FS2000 costs $6,500. The DP Series Data Package varies in price depending on the configuration.

Pertec Peripherals, 9600 Irondale Ave., Chatsworth, Calif. 91311.

■

MDB Systems, Inc. has introduced the **MLSI-2322** and **MLSI-2333**, two disk subsystems for Digital Equipment Corp.'s Q-bus computers.

Both have a rack-mountable chassis that contains the disk drive, power supply, control panel, appropriate disk controller and 10-ft interconnection cable. The MLSI-2322 unit contains a Fujitsu America, Inc. M2322K drive and offers 134M bytes of disk storage space.

The MLSI-2333 unit uses a Fujitsu M2333K drive and has a data transfer rate of 2.4M bit/sec. It offers 256K bytes of storage space.

The MLSI-2322 costs $9,640, and the MLSI-2333 costs $12,850.

MDB Systems, 1995 N. Batavia St., Orange, Calif. 92665.

■

Emulex Corp. has introduced the **QD32** dual-wide disk controller designed to connect storage module disk drives to Digital Equipment Corp.'s Q-bus-based processors while emulating DEC's KDA50.

The QD32 has an adaptive direct memory access feature that transfers data in 16-, 18- and 22-bit addressing modes as well as block mode. It buffers up to 13 commands and offers seek ordering. It is capable of handling Q-bus direct memory access speeds of up to 2.5M byte/sec. It has a 32K-byte buffer.

The QD32 costs $2,200.

Emulex, P.O. Box 6725, 3543 Harbor Blvd., Costa Mesa, Calif. 92626.

■

AMF Logic Sciences, Inc. has announced the **Turbograph DDS-11 Disk Storage System** designed to relieve the host computer of unnecessary participation in graphics processing tasks.

Data enters the system through AMF's HSRCOL applications software to a front-end processor as a compressed metafile. The processor then routes data to an HSR-11B graphics processor, included with the DDS-11, for rasterization.

Rastered data is stored on the disk system, which can be configured with up to 1G byte of memory. The DDS-11 includes built-in interfaces that support multipass and control requirements of individual plotters. Simultaneous four-color raster generation is supported to allow multiple copies to be plotted without registration by the host CPU.

The Turbograph DDS-11 Disk Storage System lists for $33,000 in single quantities.

AMF Logic Sciences, 10808 Fallstone Road, Houston, Texas 77099.

Terminals

Plexus Computers, Inc. has introduced a **terminal**, dot matrix and daisywheel **printers**, a **tractor feed** and two **sheet feeders**.

The terminal includes a 14-in., 24-line green phosphor screen, a detachable keyboard and two asynchronous serial ports.

The dot matrix printer is a 24-wire impact type with bidirectional, single-pass printing at speeds of 80 char./sec. in the letter-quality mode and 240 char./sec. in the draft mode. The daisywheel printer features bidirectional operation at 48 char./sec.

The terminal costs $795. The dot matrix and daisywheel printers cost $1,990 and $1,500, respectively. A single-bin sheet feeder costs $520, and a dual-tray model costs $980. A tractor feed for the daisywheel costs $235.

Plexus Computers, 3833 N. First St., San Jose, Calif. 95134.

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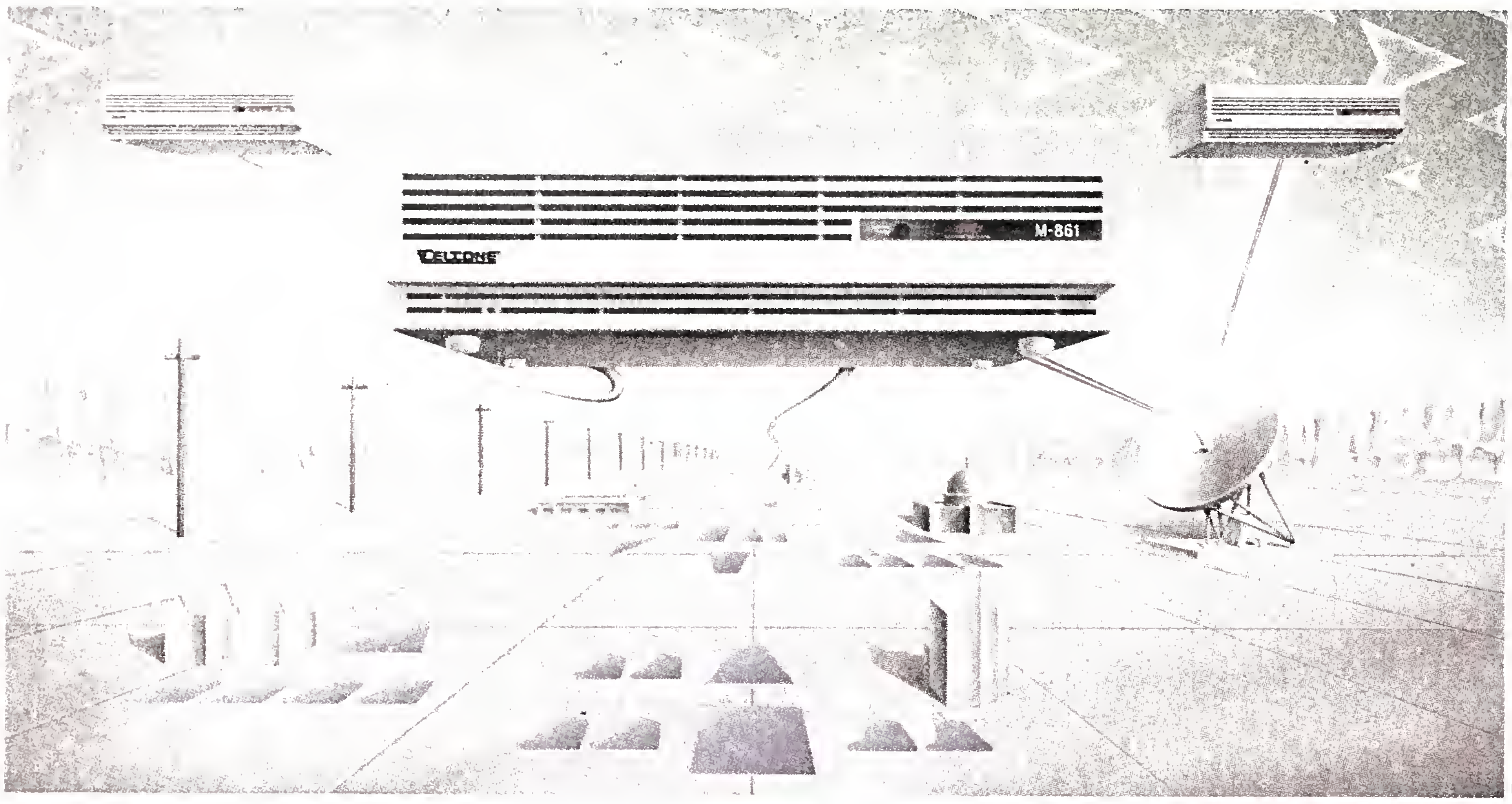

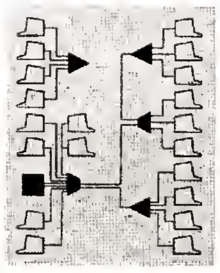
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COMPUTER INDUSTRY

INDUSTRY INSIGHT
Clinton Wilder
and Rosemary Hamilton
CW Senior Writers

Masi weathers Wang hurdles

J. Carl Masi has marketing in his blood. Little wonder he has earned the title of executive vice-president of sales and marketing at Wang Laboratories, Inc. He can blend honesty with just the right amount of hype to paint a very nice picture — even after his company suffered the worst year in its history.

Masi showed his stuff at a recent gathering of MIS executives at a Wang-sponsored conference in Boston. His brief, unscheduled talk at the seminar, called "Future Trends II: Software Development," focused on Wang's marketing, product and service strategy.

He worked hard to befriend his audience. Posing the question, "You're never happy, are you?" the marketing man answered for them, "Well, you shouldn't be."

Masi was at his best when referring to the recent troubled times at Wang as a "period of transition." No specific mention was made about the company's severe losses, its layoff of more than 1,500 employees or its loss of No. 2 man John Cunningham.

But his indirectness on that subject was balanced by candor in other areas, specifically when he outlined the company's various strategies.

On Wang's product strategy, Masi said the company will concentrate on base technology with added unique capabilities. The reason: "Otherwise, there will be no reason to buy Wang instead of IBM," Masi said. "We are recognizing that we can only be better

See **MASI** page 104

IBM at Rolm: More than blue suits and sneakers

By Maura McEnaney and Peggy Watt

SANTA CLARA, Calif. — In late October 1984, one of the most creative entries in Rolm Corp.'s spirited Halloween costume contest was an employee robed in the the blue jeans uniform of Silicon Valley start-ups. But he topped his attire with the white shirt, tie and blue suit jacket that are synonymous with the company's equity partner, industry giant IBM.

A few weeks later, all Rolm employees found themselves with a merged corporate identity when the 15-year-old maverick telecommunications company was acquired by IBM for $1.25 billion. The board of directors gave its blessing, and champagne corks popped in celebration a year ago this week.

> ”
> *'Rolm is a creative but loose group. . . . It's been a little looser about products. But when you're IBM, you have to do it perfect the first time.'*
> — **Rolm employee**

Speculation was rampant that the unique Rolm culture, credited by many with driving the company to revenue of more than $600 million, would give way to more traditional working conditions.

Although the company's culture appears unchanged — sportswear-clad employees still work out at the company's recreation center, the name tags still say "Rolm" and workers in blue jeans can still be spotted ambling across the Rolm grounds — observers said they believe IBM is putting its mark on Rolm in a much more subtle manner.

IBM employees are on the job at Rolm, working as liaisons at each management level. Steven Schwartz, IBM vice-president and telecommunications specialist who was IBM's liaison to Satellite Business Systems until IBM traded it for a share of MCI Communications Corp., handles day-to-day interaction with Rolm. Though Rolm cofounder Kenneth Oshman now reports to Jack Kuehler, IBM senior vice-president for manufacturing and development, he remains president at Rolm.

The most obvious area of IBM influence is in the Rolm marketing strategy, considered before the acquisition to be weak domestically and virtually nonexistent internationally.

Customers today talk of joint sales calls and Rolm's newfound influence within large systems shops.

"In our most recent dealings with Rolm, IBM has had its account people present," said Glen MacKenzie, manager of communications technology at Chevron Corp., which houses one of Rolm's largest CBX II private branch exchange (PBX) installations.

But the joint missions have apparently not noticeably diverted the marketing thrust that made Rolm so appealing to IBM. "We're quite pleased — surprised, actually," MacKenzie said.

In large IBM shops, the Big Blue sales force points to the CBX II as the switching system of its choice, even over its own system.

"We are beginning to witness an integration of the marketing force," said Al Fross, vice-president of the Eastern Management Group, a consulting firm. "The IBM people are staying close to the Rolm people. They are leveraging their sales and gaining exposure in both roles."

The merger has also spawned Rolm Europe. IBM handles the marketing while Rolm Europe does development and manu-

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INSIDE

The Reagan administration has recommended filing unfair trade actions against Japanese semiconductor manufacturers/**103**

A decline in revenue, along with financial adjustments, produced a net loss at Intelligent Systems Corp., the parent company of Quadram and Princeton Graphic Systems/**105**

INSTANT ANALYSIS

"Virtually the rest of the electronics industry has stayed with the single-chip module approach until now."

— Paul McEnroe, president of Trilogy Systems, on the company's plans to develop a multichip module for nonmainframe systems

Cullinet cites sales progress but analysts see difficulties

By Rosemary Hamilton

WESTWOOD, Mass. — With its release of second-quarter results, Cullinet Software, Inc. has distanced itself even more from its super growth days of 29 consecutive quarters.

Results for the second quarter ending Oct. 31 of the software company's fiscal year 1986 were less prosperous than those reported in the same quarter a year ago. But second-quarter revenue did inch ahead of first-quarter revenue, prompting John Cullinane, president of Cullinet, to remark, "We're pleased with the progress we're making."

Revenue for the second quarter was $43.1 million, down from revenue of $43.6 million reported in the same quarter a year ago. Net income was $3.6 million, down from the net income of $5.9 million reported in the fiscal 1985 comparable quarter.

Although Cullinane noted the improvement over first-quarter revenue of $42.3 million — several industry analysts did not react so positively.

"My concern is that this kind of performance may last a while longer," according to Terence Quinn, an analyst with Dean Witter Reynolds, Inc. in New York. "These trends don't abate in one or two quarters."

Cullinane, however, said he sees the quarter as a success because "our goal was to do better than the first quarter, which was pretty much on target."

Yet Kenneth Burke, an analyst with Alex Brown & Sons, Inc. in Baltimore, said he believes Cullinet will "continue to experience some difficulties." Burke added,"They've had modest growth in sales of their data

See **CULLINET** page 105

Disappointing fourth quarter ends HP's lean fiscal year

By Clinton Wilder

PALO ALTO, Calif. — Seeing a continued decline in its overseas business and little pickup in domestic sales, Hewlett-Packard Co. reported a 23% decline last week in its fourth-quarter earnings on virtually flat revenue.

The disappointing quarter ended one of HP's leanest years ever, as the veteran minicomputer and scientific instruments vendor posted a 10% drop in profits for fiscal year 1985, ended Oct. 31. Sales increased just 8% from 1984.

Fourth-quarter earnings were $127 million, or 50 cents per share, compared with $167 million, or 65 cents per share, a year earlier. Revenue dipped slightly from $1.688 billion to $1.685 billion.

HP President and Chief Executive Officer John A. Young said domestic order levels were "somewhat stronger" during the period, while overseas orders, accounting for 45% of HP's revenue, remained sluggish. U.S. orders totaled $966 million, up 9% from the year-earlier quarter, but international orders declined 9% to $629 million.

"Overall, we remain cautious," Young said. "We have been lowering our prices as the dollar has weakened against local currencies . . . but this action comes in a period of economic uncertainty in some markets."

Young said HP would continue its cost-reduction measures of reducing its work force of 84,000 people by attrition, cutting salaries and instituting unpaid furloughs. But the firm "expects to ease required unpaid time off as allowed by improving business conditions," he added.

See **HP** page 105

Software AG Users spell it out...Datapro™ survey rates ADABAS

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Influence of IBM style at Rolm

From page 99

facturing in the U.K. IBM also lends a hand in Rolm's international telecommunications division.

Aside from marketing, analysts examining Big Blue's influence on the telecommunications company are quick to point to the October announcement of the Token-Ring as IBM's choice of local-area networks. A commitment to Rolm's CBX products and adaption of twisted-pair wiring to the IBM Cabling System was a significant sidelight to the long-awaited announcement.

"It was the first IBM-Rolm announcement, but IBM ran the show," said Ian Angus, president of Angus Telecommunications Group. In fact, most Rolm divisions have an IBM liaison assigned to them, according to Rolm spokesman Kenneth Rowe.

The liaison "helps Rolm deal with the IBM organization," a far larger entity than Rolm's entrepreneural bureaucracy, Rowe said. Liaisons report to the Rolm division head but are on the IBM payroll.

Beyond the product presentation, October's Token-Ring announcement revealed some significant strategies for Rolm.

"IBM has come up with the architecture that shows how the CBX will fit into the IBM environment," Angus said. "[IBM] is making the CBX the core to linking together all the ASCII devices."

Complete integration way off

Despite the direction toward the CBX II, some analysts said they believe complete integration with the IBM product line still appears way off.

"The CBX II is an IBM-recommended PBX option, but it is still a separate product. There will be no real integration of the IBM and Rolm product line in the next three or four years," predicted Brian Jeffery of the International Technology Group in Palo Alto, Calif.

However, it is not that Rolm has ignored IBM in the past; its Cypress family of integrated voice/data systems features the Cedar, an IBM-compatible microcomputer with built-in telephone, and the Juniper, a telecommunications unit designed to attach to the IBM Personal Computer and compatible micros.

In the past year, Rolm has introduced several enhancements to existing products as well as broadened current product lines with new models. The capacity of Rolm's PhoneMail voice message service line, introduced in 1982, was increased to handle as many as 8,000 users on 128 channels. Later, a new version to serve non-Rolm PBXs or Centrex systems was released.

The CBX II line was enhanced to accommodate better the least-cost, long-distance call switching popular in many businesses upon the advent of equal access. And this fall, Juniper was upgraded with personal computer-resident communications packages to operate with IBM's host-based Distributed Office Support System. The next version, of course, is the promised local-area network link.

However, employees working on those upcoming products said Rolm seems to be adopting the IBM slow-but-sure philosophy — not going out on a limb — of introducing a product only after the market is clearly demonstrated.

"Rolm is a creative but loose group. There's a lot of Indians and few chiefs," one employee said. "Maybe it's been a little looser about products. But when you're IBM, you have to do it perfect the first time." Observers said that caution underscores Rolm's role in the foreseen head-to-head battle between IBM and AT&T.

International Technology Group's Jeffery said he expects increasing emphasis on the CBX II, even to the point of taking on the electronic mail/voice traffic functions of the Cypress line.

"In the future, we can expect to see the CBX II as a distinct product line, a CBX II attachment option for all IBM products, with emphasis on" IBM Personal Computers and the System/36, he said.

Fross of Eastern Management Group said he expects Rolm applications products will proliferate in the next few years to pair with upcoming IBM products.

Whether Rolm will keep the products coming to market on time will depend on the company's research and development efforts, other analysts said. And that is just the area that has been noticeably beefed up since IBM took the reins.

Approximately 10,000 employees now

Rolm has a total of approximately 10,000 employees now, up some 2,000 from a year ago, but would not specify how many transferred from IBM divisions.

"IBM has thrown R&D people into Rolm. Rolm is much faster now than it was about a year ago," according to Angus.

The employee count increased even with the loss of about 1,000 employees in the Mil-Spec military computer division that was sold at the order of the U.S. Department of Justice to satisfy antitrust laws. The division accounted for about 15% of Rolm sales.

Loral Corp. of New York picked up the division in April for $100 million after a conditional agreement fell through for a leaveraged buyout by Mil-Spec employees.

But while Rolm employees' former colleagues at Mil-Spec are getting used to a new boss, much of the average worker's life goes on the same.

"There've been no take aways" of benefits, Rowe said. Among those

The Cipher

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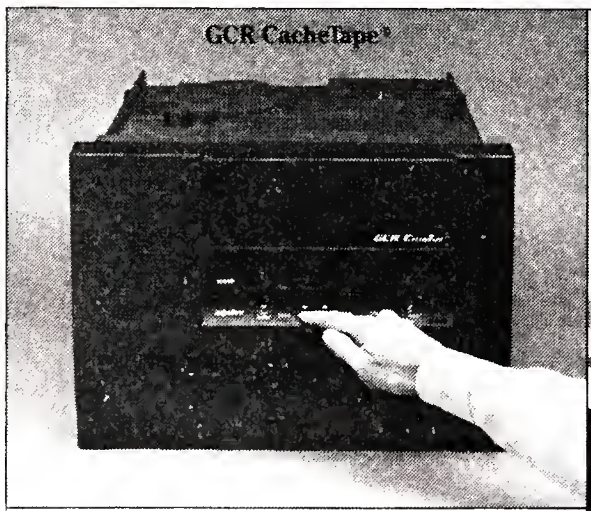

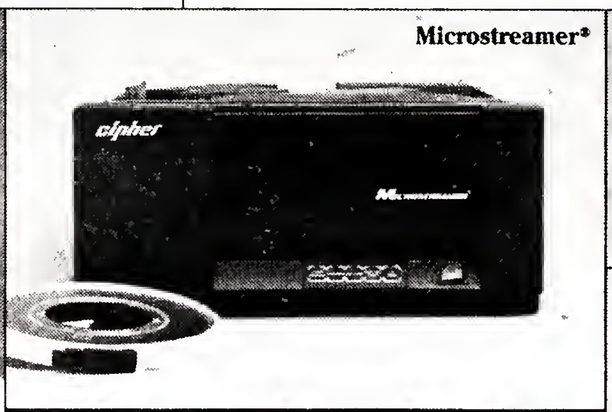

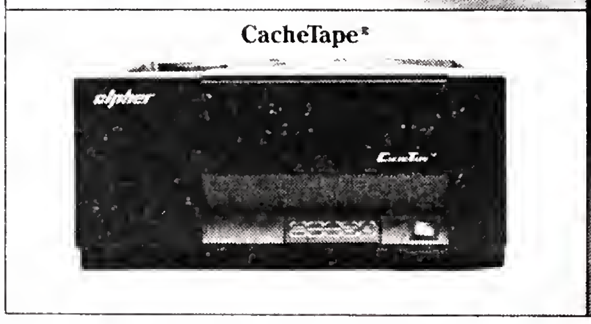

For a copy of Cipher's annual report, call 1-800-4-CIPHER, ext. 9.

much-publicized benefits — many unmatched at IBM divisions — are flex time that allows employees the opportunity to use the company's extensive recreational facilities and a paid, three-month sabbatical available to all employees after six years at Rolm. The sole exception is a change in the stock-option plan to conform with the IBM equivalent, a tax-deferred savings plan that is no slouch.

The accounting department probably had the biggest adjustment, a change in Rolm's fiscal year from the June/July schedule to conform with IBM's calendar year budgeting.

"I didn't even know [until] I'd been there a month and a half that they were an IBM company," said a temporary agency employee who is often assigned to Rolm. "I've yet to see an IBM memo."

Though IBM is newly in charge, it is not a newcomer to Rolm. IBM's buyout last year picked up the remaining 77% of Rolm stock available, following an intial 15% purchase of Rolm stock in 1982 and another 8% after that.

Even then, there were nervous jokes about the giant moving in. Rolm cofounder Oshman once joked that anyone caught wearing a white shirt three days in a row would risk dismissal for trying to subvert Rolm culture.

He later tested IBM representatives' sincerity about retaining the Rolm lifestyle by offering them suds at the regular Friday beer bash, despite IBM's iron-clad no-drinking rules.

Those beer bashes aren't as frequent, perhaps, but they still occur when the occasion warrants.

When Rolm landed a $14.3 million installation at the University of Rochester, New York, earlier this month, Oshman called for a toast to celebrate the sale of Rolm's third largest CBX II system, serving 13,000 voice and 5,400 data lines.

IBM liaison Bill McDonnal, of IBM's systems development group, in IBM casual — sweater over white shirt — approached the microphone to lead the festivities. Members of the crowd passed a sudsy mug to him and cheered when he took it.

Oshman then told McDonnal, according to employees, "I hope you realize that with us being here, it puts to rest those rumors about the death of the beer bash." McDonnal, Oshman continued, had a mug in his hand before his speech, "and I'm glad to see he's got one in his hand again." The crowd cheered.

U.S. lodges trade gripes

By Bryan Wilkins

WASHINGTON, D.C. — The Reagan administration, making good on its campaign to take action against trade injustices it said are hurting U.S. industry, has completed two separate investigations of Japanese electronics exports and has recommended that unfair trade charges be filed against Japan.

A Cabinet-level strike force investigating alleged Japanese dumping of 256K-byte random-access memory chips in this country has recommended that President Reagan initiate unfair trade complaints with the Japanese government for selling the 256K-byte semiconductors in the U.S. below manufacturing cost.

At the same time, the strike force urged speedier government efforts to open Japanese semiconductor markets following a complaint filed by the U.S.-based Semiconductor Industry Association (SIA), which charged that U.S. companies are barred from penetrating the lucrative Japanese market by Japanese buying practices.

The charges have been strongly denied by Japanese industry and government officials, who have lobbied heavily to thwart the allegations in Washington, D.C. The SIA complaint requires the U.S. government to investigate the charges and, if proven to be true, to impose tariffs on Japanese electronics exports to the U.S.

In a related move, the International Trade Commission has ruled that three U.S. manufacturers — Advanced Micro Devices, Inc., Intel Corp. and National Semiconductor Corp. — have been subjected to below-cost pricing by Japanese chip manufacturers in the U.S. The International Trade Commission action did not go any further in recommending retaliation.

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COMPUTER INDUSTRY

Masi weathers Wang hurdles

From page 99

by degree." Target areas for product development include telephone and computer integration, imaging systems and proprietary application software.

The future marketing strategy will focus on Wang's installed base, Masi said, noting that it has not been the top priority in the past. "When you're growing at 41%, there's only one focus — growth," he said. In the future, Wang will concentrate on "keeping users happy," as they hopefully migrate or upgrade to Wang's VS systems.

Masi prefaced his comments about Wang's service strategy with a second reference to the company's rapid growth. "At 41% [growth] you don't have much time to think. Now we see profitability in oversupporting our customers," he said. To achieve this, Wang must become "its own best user to better serve our customers," Masi said.

Masi said he believes Wang is more capable of putting those strategies in place now because it is a mature company. "We went through our infancy, our rebel teen years and our 20s when we thought we were the center of the universe," he said. "Now we see ourselves as an adult."

He then went on to expound on how Wang will reach new successful heights. And just when the picture he was painting got too rosy, he said, "We're not there yet, that's for darn sure."

■

Whether or not you're a fan of Apollo Computer, Inc., you can't accuse the company of sitting on its hands. Fresh from its third-quarter losses and layoffs, Apollo kept the business wires buzzing recently with a major OEM agreement with Alliant Computer Systems Corp., $3.8 million worth of joint venture work with Spectragraphics Corp. and the dramatic resignation of founder and Chairman J. William Poduska to start a new company.

> ”
>
> *You can't accuse Apollo Computer of sitting on its hands.*

The last development, which raised eyebrows from Chelmsford, Mass., to Cupertino, Calif., bears watching. The dynamic Poduska said he followed the entrepreneurial "call of the wilderness" this time to develop workstations that Poduska envisions will place high-end mainframe power on the desktop. A 20 million to 30 million instructions per second machine by early 1987 sounds awfully ambitious for a company that doesn't yet have a name, but time will tell.

As for Apollo, it is clear that management is pulling out all the stops to restore its former standing as one of the computer-aided design and engineering market's notable success stories.

Apollo's recent gloomy financial news proved how far the high flyers could fall in the industry this year. But by reaching out to the IBM mainframe environment with Spectragraphics and adopting Alliant's parallel processors for CPU power, Apollo served notice that it won't mind strategic partners in its attempted return to the top.

■

While Cliff Robertson attempts to do for long-distance telecommunications what Lorne Greene did for dog food, two other high-tech companies recently joined the personality parade. The clear voice of network sports announcer Dick Enberg will be hawking wares for GTE Corp., while Sperry Corp. has enlisted veteran actor Kirk Douglas as a corporate spokesman. Douglas is part of Sperry's most extensive (and doubtless most expensive) advertising campaign ever.

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Intelligent Systems posts $2.5 million second-quarter loss

Company blames industry slump

By James A. Martin

NORCROSS, Ga. — Intelligent Systems Corp. recently said it lost $2.5 million in the second quarter ended Sept. 30, compared with a net income of $2.5 million, or 23 cents per share, for the same period in 1984. Second-quarter revenue declined from $29.6 million to $26.8 million.

For the first half of its fiscal year 1986, also ended Sept. 30, the company said that its revenue was $55.2 million, compared with $59.8 million for the year-earlier period.

Net income for the first six months was $1.7 million, compared with $6.3 million in fiscal 1985.

Losses for the second quarter and first six months are a result of an industry slowdown on personal computer enhancement board products and terminals, a spokesman said. The company said an inventory adjustment of more than $2 million for printers and hard disks purchased for resale last year was included in cost of goods sold.

An undisclosed reserve for long-term notes receivable "was also provided due to the uncertainty of future collections," the spokesman added.

Intelligent Systems said that it is anticipating a stronger third-quarter performance due to increased monitor sales from its Princeton Graphic Systems division and the unveiling of new products such as an IBM Personal Computer AT enhancement that was announced by its Quadram Corp. division at Comdex/Fall 1985 in Las Vegas.

HP declining quarter ends

From page 99

For the year, HP's domestic sales grew just 5% to $3.69 billion, while revenue from overseas sales increased 12% to $2.81 billion. Year-end net earnings dropped by $58 million to $489 million. Earnings per share for the year were $1.91, down from $2.13 per share a year ago.

The 1984 amounts did not reflect a one-time tax benefit of $118 million, or 46 cents per share. The tax benefit came from a tax law change related to the company's Domestic International Sales Corp.

Orders for the year increased by only 1% to approximately $6.4 billion.

Cullinet cites sales progress

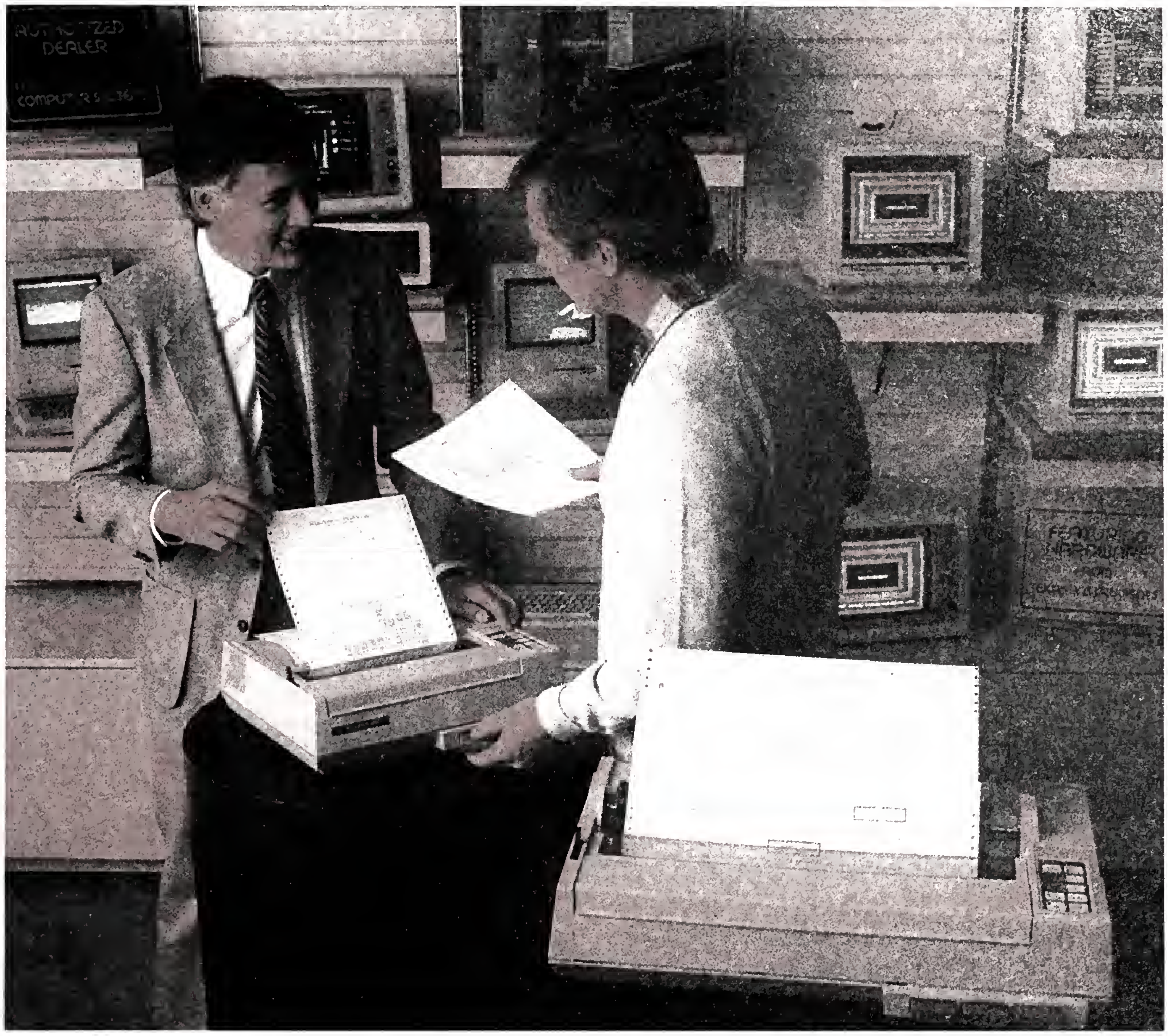
From page 99

base management systems. [Sales in] both their applications and information center products have actually declined, and those two pieces were what fueled the overall growth."

Burke, who said he was "not surprised to see [Cullinet] coming in where it did," said he doubts the software company will return to the whopping growth it experienced in the past. In fiscal year 1985, for instance, Cullinet reported a 53% increase in revenue to $184 million and a 50% increase in net income to $24.7 million from the previous year.

In a separate matter, both Burke and Quinn said they had trouble getting a handle on Cullinet's performance for the second quarter because the company refused to comment.

Cullinane acknowledged that his company had invoked a quiet period two weeks prior to and two weeks following the end of the quarter. "It was the most restful period we've ever had," Cullinane said.



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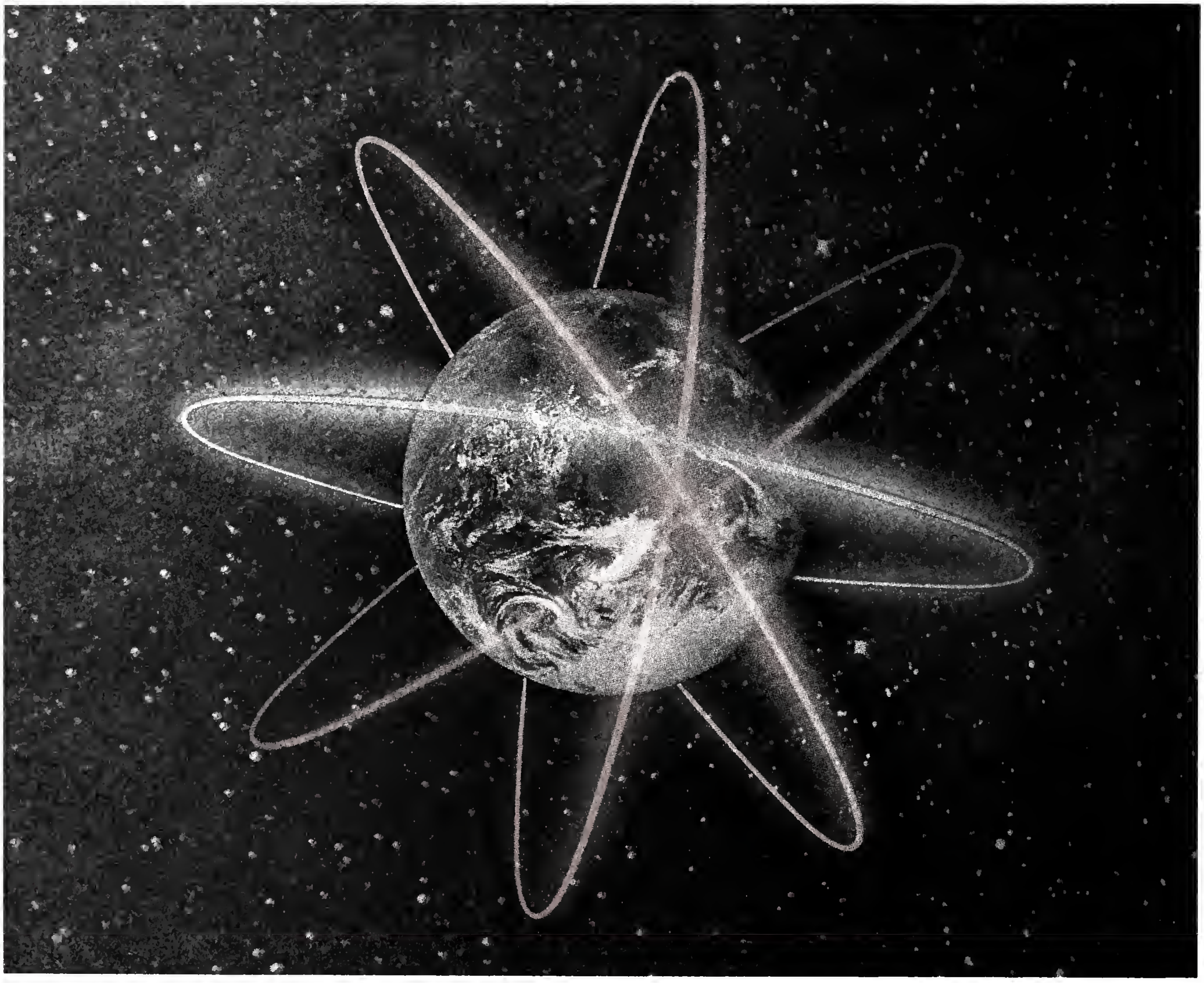

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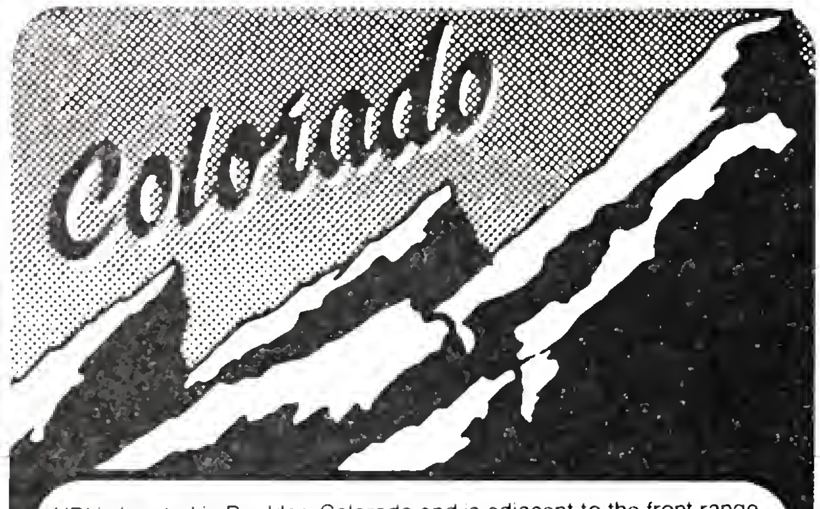

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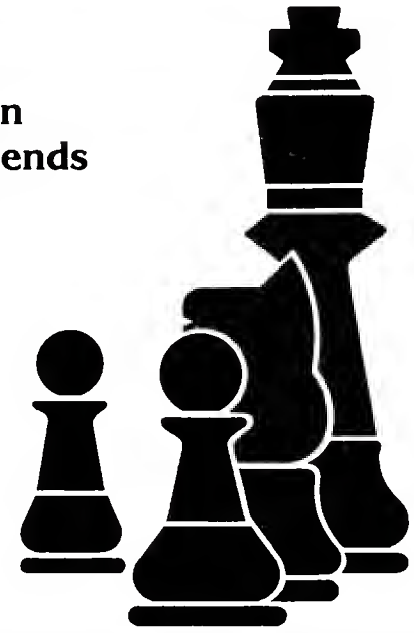
Whether you win or lose . . . depends on the moves you make . . .



The opening moves in a game of chess predetermine the outcome of the entire game. If you are wise the right moves can lead to an easy win. If you are unwise the wrong moves can lead to a painful loss.

In many ways the same is true of your computer career. After two or three years of experience you are ready to make the opening moves in your career advancement. But, just as in chess, you need a great deal of experience to know which moves are the best for you . . . and you don't have the necessary expertise required.

But we do! That's why you really need NCA. We can show you more, completely detailed, career opportunities, both locally and nationally, than you are likely to find elsewhere. Furthermore, our long association with employers has given us the inside information that is needed to help you to determine your best career moves.

All of our specialized services don't cost you one cent because employers pay our fees. So, if you're ready to make your opening career moves, you'll make them most wisely by: coming in, calling or mailing your resume to the NCA firm nearest to you.

ATLANTA: BAI Limited
3475 Lenox Road N.E., Suite 490-C
Live Oak Center
Atlanta, Georgia 30326 (404) 231-4545

BOSTON: Robert Kleven and Co., Inc.
North Brook Park, Suite One, 181 Bedford Street
Lexington, Massachusetts 02173 (617) 861-1020

CHICAGO: Thos. Hirtz & Associates
150 N. Wacker Drive, Suite 1700
Chicago, Illinois 60606 (312) 977-1555

CLEVELAND: Innovative Resources
Statler Office Tower, Suite 426
East Twelfth and Euclid
Cleveland, Ohio 44115 (216) 621-4220

COLUMBUS: Michael Thomas, Inc.
65 E. Wilson Bridge Road, Suite 201
Worthington, Ohio 43085 (614) 846-0926

DALLAS: DataPro Personnel Consultants
12720 Hillcrest, Suite 520
Dallas, Texas 75230 (214) 661-8600

DENVER: Abacus Consultants, Inc.
1777 South Harrison, Suite 404
Denver, Colorado 80210 (303) 759-5064

DETROIT: Electronic Systems Personnel, Inc.
3000 Town Center, Suite 2580
Southfield, Michigan 48075 (313) 353-5580

FLORIDA: Data Sciences Personnel, Inc.
P.O. Box 8577
Hollywood, Florida 33024 (305) 434-6112

HARTFORD: Compass, Inc.
900 Asylum Avenue
Hartford, Connecticut 06105 (203) 549-4240

HOUSTON: Career Consultants, Inc.
1980 Post Oak Boulevard, Suite 1050
Houston, Texas 77056 (713) 626-4100

INDIANAPOLIS: Career Consultants
107 N. Pennsylvania, Suite 404
Indianapolis, Indiana 46204 (317) 639-5601

KANSAS CITY: D. P. Career Associates
6405 Metcalf, Suite 502
Shawnee Mission, Kansas 66202 (913) 236-8288

LOS ANGELES: Superior Resources, Inc.
Personnel Service
6016 Fallbrook Avenue, Suite 200
Woodland Hills, California 91367 (818) 884-3000

MILWAUKEE: EDP Consultants, Inc.
Chancellory Park II
350 N. Sunnyslope Rd., Suite 350
Brookfield, Wisconsin 53005 (414) 797-8855

MINNEAPOLIS: Electronic Systems Personnel
858 Twin City Federal Tower, 121 S. 8th St.
Minneapolis, Minnesota 55402 (612) 338-6714

NEW YORK: Botal Associates, Inc.
7 Dey Street, Suite 410
New York, New York 10007 (212) 227-7370

NEW YORK UPSTATE:
CFA Associates Personnel, Inc.
2530 James Street
Syracuse, New York 13206 (315) 463-5225

NORTH CAROLINA: DataMasters,
Div of TaskForce, Inc., P.O Box 6888
Greensboro, North Carolina 27405
(919) 373-1461

PHILADELPHIA: Systems Personnel, Inc.
115 West State Street
Media, Pennsylvania 19063 (215) 565-8880

PHOENIX: Professional Career Consultants
4725 Scottsdale Road, Suite 209
Scottsdale, Arizona 85251 (602) 274-6666

PITTSBURGH: Mortell, Liguore & O'Brien, Inc.
P.O. Box 836
Allison Park, Pennsylvania 15101 (412) 487-5153

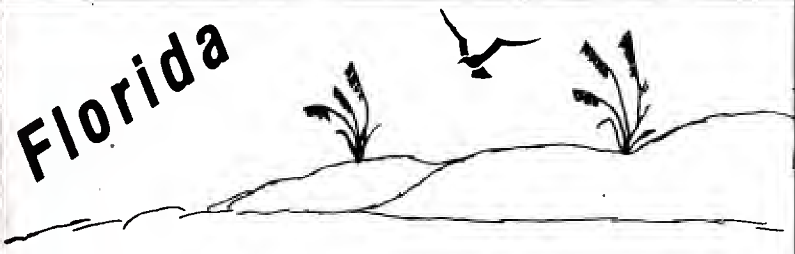
SAN FRANCISCO: The Computer Resources Group, Inc. Agency, 303 Sacramento Street
San Francisco, California 94111 (415) 398-3535

SEATTLE: Houser, Martin, Morris & Associates
1940 116th Avenue N.E.
Bellevue, Washington 98004 (206) 453-2700

National Computer Associates

Call the NCA firm nearest to you for Salary Survey and Relocation Information

EDP Placement Firms in Washington D.C., San Antonio and St. Louis can learn about the many advantages of being members of National Computer Associates by calling Elaine Stewart (315) 463-5225



Data Processing Manager

GCD, Inc., a division of Sacred Heart Health Systems, is located in Pensacola on Florida's beautiful Gulf Coast. We are seeking an experienced individual to manage operations and program support for a large progressive IBM Data Center with Dual 4300's. Qualified candidate will possess excellent communication skills, B.S. Degree, at least 3 years programming experience, and a minimum of 2 years in a managerial capacity. We offer competitive compensation and an outstanding benefit package. Send resume and salary requirements to: Sacred Heart Hospital, Employment Office, 5151 N. 9th Ave., P.O. Box 2700, Pensacola, FL 32513-2700, or phone AC-904-474-7200.

gcd
GULF COAST DIVERSIFIED, INC.

---

* 50 OPENINGS *

New DP and Communications Center

*** MULTI-308X's--MVS/XA * SNA * VTAM * CICS * VM * TSO * ++**
To $60,000+

*** Operations Mgmt.**
*** Systems Software**
*** Datacommunications**
*** Network Engineering**
*** Operations Analyst**
*** Network Operations**

Our client, one of the largest, most profitable, prestigious companies in the country, is building one of the world's most sophisticated Data Processing and Communications Facilities in an attractive Suburban Mid-Atlantic location.

Interviewing now for the first fifty professionals who will form the core group for expansion. They will hire the best operations, systems software and communications pro's and will reward them with the best compensation, technical environment, and career opportunities.

All fees paid, including outstanding total relocation package. **CONTACT H. GREENE, 215/735-5010 or send resume to:**

FOX-MORRIS EXECUTIVE SEARCH

The Fidelity Building
Broad & Sansom St., Phila., PA 19109

DATA PROCESSING
POSITIONS AVAILABLE IMMEDIATELY

A nationally respected professional organization based in NW suburbs of Atlanta has a number of opportunities immediately available for professionals with expertise in such areas as:

- **Systems Analysis**
- **Applications Programming**

The Applications Programming and Systems Analysis/design positions require a minimum of 2 years of development experience using PL/I together with 2 years experience with major DBMS or 2 years development experience using a major fourth generation language.

Our state-of-the-art environment includes a 30835, MVS/XA, TSO, CICS, ADABAS, NATURAL, GDDM, ISPF.

We are currently involved in developing new fourth generation systems for our organization enabling you to make a significant contribution through your talents and ability. We are offering a competitive salary and benefits package, which includes tax-sheltered annuity eligibility, company-matched saving plan, and home sale and relocation assistance. For prompt, confidential consideration please forward your detailed resume to:

Linda Kobel • Personnel Supervisor
1100 Circle 75 Parkway • Atlanta, GA 30339

INPO

An Equal Opportunity Employer M/F PRINCIPALS ONLY

SYSTEMS SPECIALISTS

Our client, a Northwest Ohio-based developer of software products, is seeking systems specialists/project leaders for the following disciplines: manufacturing, retail/wholesale and construction.

Candidates should have approximately four (4) years of systems design experience in one of the above industries. Experience in project management is a plus. An undergraduate degree in computer science or business is a must.

This position offers substantial opportunity for advancement, an excellent salary, bonus consideration, and a competitive benefit package. Qualified candidates should send resume or letter, in complete confidence, including salary history to:

C&L | Coopers & Lybrand

COOPERS & LYBRAND
EXECUTIVE SEARCH - MJTL
400 RENAISSANCE CENTER
DETROIT, MI 48243

An Equal Opportunity Employer

CICS

CGA Computer, Inc. currently has outstanding opportunities available in the area of software development and business applications. Positions require working knowledge with on-line CICS, in an IBM mainframe environment.

We are offering above-average compensation, time-and-a-half for overtime and an excellent benefits program.

For consideration, please call or send resume in complete confidence to:

CGA Computer, Inc.
212 West National Road
Vandalia, OH 45377
1-800-543-7583.
In Ohio, (513) 890-1208.

Subcontractors welcome.
Equal opportunity employer M/F.

EMPLOYMENT SERVICE FOR PROGRAMMERS AND ANALYSTS

National Openings With Client Companies and Through Affiliated Agencies

Scientific and commercial applications • Software development and systems programming • Telecommunications • Control systems • Computer engineering • Computer marketing and support

Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees. We guide, you decide.

RSVP SERVICES, Dept. C
Suite 700, One Cherry Hill Mall
Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
Suite 201, Dublin Hall
1777 Walton Rd., Blue Bell, PA 19422
(215) 629-0595

From outside New Jersey, call toll-free 800-222-0153

RSVP SERVICES
Employment Agents for Computer Professionals

NEW ENGLAND

BOSTON
SYS. PROG. SUPERVISOR

NH - Highly regarded NH mfg firm seeks Sys Prog Supvr for multi-CPU IBM shop Environ is MVS VTAM NCP VM minis Oppty to plan and lead major upgrades and save on taxes too. $52,000

BOSTON
TELECOMMUNICATIONS ENGINEER

If you're seeking a high lvl. internal consult. role w/diverse projs incl VOICE & DATA, call to discuss this position! Our client is a prominent BOSTON fin'l inst who seeks talented HW configuration design & planning specialist Desirable bkgrd incl. IBM MVS SNA, DEC VAX, LANS, PBX's & nat network design & support Salary to $50,000

BOSTON
VAX PROJ. LEADER

Emerging distributor seeks tech astute proj. ldr for on-line devel. State-of-the-art VAX/VMS, COBOL, BASIC, FMS & DCL environ. incl. expanding multi-plant locations Hi visibility in growing MIS shop $35,000.

HARTFORD
PROJ. LEADER MFG.

S/38 — Direct & guide major proj. for CT mfr Should have 5+ yrs. exp. designing & programming mfg sys in user-oriented environ Good proj. control skills req'd. IBM S/38 bkgrd. pref. Salary $45,000.

HARTFORD
SR. PROGRAMMER/ ANALYSTS

2+ yrs. HP-3000, COBOL bkgrd. w/fin'l. app. qualifies for SUBURBAN area oppty Indiv. will have extensive user contact interface & design respon. Salary to $33,000.

PROVIDENCE
MIS DIRECTOR

Direct the D.P. activities in a lge IBM 4300 MVS facility. Min. 10+ yrs. progressive sys mgmt. exp. Health care sys. bkgrd. desired. B.S. degree req., MBA desired. $40,000 - $50,000.

ROBERT HALF

EDP PERSONNEL SPECIALISTS

Contact the Manager of any office listed below.

100 Summer St., Boston, MA 02110
(617) 423-1200
111 Pearl St., Hartford, CT 06103
(203) 278-7170
900 Turks Head Bldg., Providence, RI 02903
(401) 274-8700

®

Client Companies Assume All Fees.

ASSISTANT DATA PROCESSING MANAGER

Life General Security Insurance Company, primarily a Group Life & Health carrier located in Coral Gables, Florida has an excellent career opportunity in its data processing division for an assistant manager (number two position within the department). Solid experience working with a variety of **health** insurance applications in a mainframe environment, solid COBOL coding background, supervisory experience and excellent communication skills are absolute requirements.

If you'd like to be considered for this opportunity, please send your resume with salary history to:

LIFE GENERAL SECURITY
Attn: Linda Samano
1550 Madruga Avenue
Coral Gables, Florida 33146
An Equal Opportunity Employer

PROJECT LEADERS/ PROGRAMMERS/SYSTEMS ANALYSTS

The Christian Broadcasting Network, Inc., located in Virginia Beach, Virginia, has current openings for Project Leaders/-Programmers/Systems Analysts to support the data processing needs of CBN University. We are currently in the process of development, design and implementation of computer systems for the areas of administration, for student and financial systems, automated library systems, office automation and academic support systems. CBN University currently awards Master's degrees in the Schools of Biblical Studies, Business Administration, Communications, Education, Public Policy and Journalism. If you are a Data Processing professional with experience in university computing systems and desire to apply, send resume and salary requirements, in confidence, to:

The Christian Broadcasting Network, Inc.
Employment Department - Box GC
CBN Center
Virginia Beach, VA 23463

PROGRAMMER/SYSTEMS SANTA CLARA COUNTY MVS SYSTEMS PROJECT LEADER

Opportunities for experienced Systems Programmers to assume key responsibilities for MVS system generation and tuning, staff supervision, project management and application development support.

Your professional profile must include 3+ years generation/maintenance for an MVS operating system, including performance tuning. CICS, IDMS, VTAM or MVS/XA background desired. Knowledge of IBM 303X or 308X required. Salary $3420-$4160 effective monthly.

Write or call Santa Clara County, Data Processing Center, 1555 Berger Drive, Bldg. 2, 3rd Floor, San Jose, CA 95112, Jackie McPherron (408) 299-4301 Inquiries should reference Sr. Programming Analyst Systems Position. Equal Opportunity Employer.

COMPUTER ANALYST WANG SYSTEMS EXPERIENCE

Exciting opportunities exist for Systems Analyst developing Navy Logistics Software System with locations in either Alexandria or Norfolk Virginia areas Successful candidates will plan, design, and develop large scale systems in COBOL using WANG/VS-100 hardware. Applicants should possess verbal and written skills, strong leadership qualities, US citizenship and the following credentials:

- 5 + years COBOL Application Experience
- B. S. in Bus. or Technical Field or Equivalent
- Structured sys. Design and Implementation
- 1 + years exp. Using WANG/VS Systems

Send resume to:

CW-B4719
Computerworld
Box 880
Framingham, MA 01701

Equal Opportunity Employer

SENIOR BIPOLAR PROCESS ENGINEER

Development and characterization of ADB-III process and enhancements, responsible for process optimization and integration of silicon-on-insulator technology, and the development of technical consultation activities.

Ph.D. degree in Metallurgical (or Mineral) Engineering. Requires 3 years experience in metallurgical process development and process integration. Requires experience or educational background in surface chemistry, metallurgical processing and surface analysis, electronic materials processing, electron microscopy, and thin film technology. Salary: $3180 per month.

Submit resumes to:

Mr. Dick Hewetson
#5-121
Minnesota Job Service
309 Second Avenue South
Minneapolis, MN 55401

SALES REPRESENTATIVE

Duties: Analyze needs of customers in area of Ouebec Canada; confer with, and recommend to, French-Canadian customers computer software and systems that best meet requirements. Promote computer software sales in Ouebec area. Experience Required: 2 years in sales or business management, including 1 year sales experience in Ouebec area. At least 1 year's sales experience in Ouebec area essential. Must speak, read and write English and Canadian-French. Must travel to Canada 3-4 times per year for periods of up to 2-3 weeks. Salary: $18,000 per year plus commission. 40 hours per week, 9 a.m. to 6 p.m. Send resume to 7310 Woodward Ave. Room 415, Detroit, MI 48202, Ref. #58385. "Employer Paid Ad" DOT 275.257-010.

PROGRAMMER/ANALYST
IDMS, CICS, ADSO

Training and consulting. Flexible work schedule. Excellent potential for personal development. Excellent salary and benefits. Send resume to:

Personnel Department
ICCS
10 East 21st Street, 3rd Floor
New York, NY 10010
(212) 777-5040

DATA PROCESSING MANAGER

Salary: $34,992 - $42,528 annually. (Plus 5.5% effective 1/86 and excellent management benefits). To administer city data processing services. Degree in Computer Science or related field and 3 years of increasingly responsible experience in computer operation and systems development and design including 1 year in a supervisory capacity. Apply City of Fairfield Personnel, 1000 Webster Street, Fairfield, CA 94533. 707-426-5500, ext. 2096. Closing date December 30, 1985. EOE/AA Employer.

COMPUTERWORLD CLASSIFIEDS--

--PROGRAMMED TO HELP YOU

The computer industry is dedicated to developing greater efficiency and valuable time-saving resources for the business world.

Well, so are ***Computerworld Classifieds.***

And we can deal with a lot of problems. Our classifications include:

Position Announcements -- To help you find the computer professionals right for you.

Positions Wanted -- For individuals seeking full-time, permanent positions - no company ads are allowed.

Buy, Sell, Swap -- For those seeking to buy, sell or lease computer equipment.

Time & Services -- For companies who want to offer computer timesharing or other computer-related services.

Software For Sale & Software Wanted -- Used for buying & selling software packages.

Business Opportunities -- For those seeking individuals or partners in computer-related business ventures, mergers, or franchises.

Real Estate -- For those seeking to sell or lease office space suitable for computer rooms or computerized businesses.

Bids & Proposals -- Used to request for bids on equipment or to invite proposals for desired computer acquisitions.

The Computerworld Bulletin Board -- This is a low-cost way to buy or sell individual pieces of hardware or software. Sell below for details on sizes and cost.

Here's the data you need to know to place your ad:

The deadline for classified advertising is ten days prior to the issue desired. (That's six working days prior to the issue date). Ads may be sent in by mail. For camera-ready ads, a velox or negative is required. For ads to be typeset by us, enclose a layout if needed, along with any logs or artwork you would like to include in the ad. These must be dark and clear for reproduction purposes.

Our ad takers will be happy to take smaller sized ads over the phone. We can provide simple line borders for you, if desired.

We also provide telecopier service at extensions 410 and 451.

The open line rate is $10.35 per line and there is a minimum size ad of 2 column inches (28 lines) at a cost of $289.80. Column inches are calculated by multiplying the number of columns wide by the number of inches deep that your ad is. Depth increases in half-inch increments and we accomodate up to 5 columns. Column widths are as follows:

1 column . -- .	***1 13/16" or 11 picas***
2 columns . -- .	***3 13/16" or 23 picas***
3 columns . -- .	***5 13/16" or 35 picas***
4 columns . -- .	***7 13/16" or 47 picas***
5 columns . -- .	***9 13/16" or 59 picas***

If you wish a box number to be assigned to your ad, it will cost an additional $15.00.

First-time advertisers must send either payment or a purchase order along with their ad.

For the **Computerworld Bulletin Board,** ads may be sent by mail, by telecopier or given over the phone. Space is available in **one column by one inch deep** units only. They are set up using a **simple format with standard typefaces and no borders or logos are allowed.** The cost of one standard unit is $140.00. These units may be combined to form deeper ads.

So, whatever the problem, simply supply us with the data we need to help you on your way to a solution, quickly and efficiently.

If you wish to reserve space, or would like more information, call us at **1-800-343-6474** or (in Mass.) **617-879-0700**. All materials should be sent to:

COMPUTERWORLD
Classifieds
375 Cochituate Road, Box 880,
Framingham, Mass. 01701

Operating System Specialist

The Lawrence Livermore National Laboratory has a challenging opportunity for a Computer Scientist to support an IBM or equivalent processor which is currently being acquired. Install, maintain and consult on VM/CMS operating system and related packages. Participate in the specification and selection of the ASSIST (Administrative Support System for Information Storage and Transfer) project.

Requires BS/MS in Computer Science, Math or related field, or equivalent experience. Minimum of one year direct experience responsible for VM/CMS installation. Working knowledge of related IBM productivity aids and other packages such as PROFS. Familiarity with Fourth Generation Languages, especially NOMAD, is desirable. Knowledge of data and terminal communications equipment and protocols a strong plus.

To apply for this position please send your resume in confidence to: **Sue Porter, Professional Employment, Lawrence Livermore National Laboratory, P.O. Box 5510, Dept. KCWBQ503B, Livermore, CA 94550.**

U.S. Citizenship required. An equal opportunity employer m/f/h/v

University of California
Lawrence Livermore National Laboratory

National Life
of Vermont

a Fortune 50 life insurer, established in 1848, with a home office in the heart of the Green Mountain ski country, has openings for the following:

IDMS/R Data Base Administrator
Support Person for ADS/O and ADS/B
Support Person for OLQ and AFS

Our rapidly expanding MIS Department is seeking highly motivated individuals with financial/business backgrounds for our systems programming area. Our environment includes two IBM 3083 mainframes operating under MVS with CICS and TSO/ISPF. We use state-of-the-art development tools and have recently installed Cullinet's IDMS/R, ADS/O, ADS/B, OLQ and ASF.

Qualified candidates will have a minimum of 3 years of programming experience including some Assembly and knowledge of our Cullinet products. Systems programming experience on a large scale IBM system utilizing OS/MVS is required. Life insurance experience desirable. Candidates must demonstrate good communication skills and ability to assume project leadership roles.

Starting salary commensurate with experience. Comprehensive benefits package available, including incentive bonus and relocation expenses.

Send detailed resume to:

Susan S. Chiappetta
National Life Insurance Company
Montpelier, VT 05604

An equal opportunity employer M/F

Systems Analyst (Int'l Consulting Specialist)

- To provide consulting support & direction to co's Int'l subsidiaries relevant to development & implementation of computer based info systems, selection of related equipment & to operating practices established for the operation of installed info systems, computer processing & communications facilities. Support introduction of new technology & common systems applications in all co's subsidiaries/joint venture locations. Must describe complex computer technology to non-data processing oriented mgmt. Must understand finance & the application of computer technology to mfg systems & finance problems. Req Bachelors degree Systems Engineering or Computer Science & 4 yrs exp in job offered or 4 yrs technical systems mgmt. Must possess programming skills (FORTRAN, COBOL, BASIC & RPG). 35 hrs/wk, $42,400/yr. Send resume to: NYS Job Service, 55 Church St., White Plains, NY 10601. Include J.O. #0702550, D.O.T. Code 012167066.

SYSTEM 38 — RPG III PROGRAMMER

Outstanding Central NY distributor has dramatic S/38 expansion plans. Need programmer/analyst w/min. 2 yrs. S/38 exp. Pref. BA/BS degree & telecomm. bkgrd. Excellent oppty. w/great firm in upstate city. Salary to $34,000.

ROBERT HALF OF BUFFALO, INC.®
420 Main Street
1310 Liberty Building
Buffalo, NY 14202
(716) 842-0801
Personnel Agency

PROGRAMMER ANALYST

CPS is adding 50 professionals to its staff by January 1st 1986 plus many other positions for 1st qtr 1986, if you have experience in any of the following

- DATA BASES: IDMS with ADSO, IMS DB/DC, ADABASE, ORACLE, FOCUS
- APPLICATIONS financial, life insurance, manufacturing, distribution, avionics/-guidance systems
- HARDWARE: IBM, TANDEM, IBM PC
- LANGUAGE: COBOL, PASCAL, PL1, ADA

All positions are full time salaried with top compensation scale & benefits Excellent growth opportunity for qualified individual

Call today or send your resume to

cps

Commercial Programming Systems
3400 West 6th St., Suite 209
Los Angeles, CA 90020
(213) 380-2681
EOE, M/F/H

BETTER YET CONNECTICUT!
S/38 - UNIX-C

The leaves are gently falling and the smell of crackling fires is in the air. Connecticut employers are aglow with numerous career opportunities. Unemployment is very low and the demand for skilled professionals far outstrips the supply. So stoke up your career by poking into these opportunities.

UNIX-C TRAINING SUPERVISOR 30-35K

A division of a multi-national Fortune 30 corporation, a leader in the information systems industry, is seeking a unique individual to head up its UNIX-C training group. To qualify, a strong technical background in UNIX and C as well as experience as a platform demonstrator is necessary. Suburban location.

S-38 positions, in a variety of environments, are available for individuals with 6 months or more experience. Below are some examples:

ELEC. MFG.- 2 Yrs. MAPICS	To 32K
HOSP.- 2 Yrs.	To 30K
MFG.- 1-2 Yrs.	To 29K
DISTR. - MGMT.	Open

For these and other opportunities, please call or send resume to:

RJS ASSOCIATES

Betsy Wilcox, or
Michael Kearns
RJS ASSOCIATES
One Commercial Plaza
Hartford, CT 06103
(203) 278-5840

Personnel Placement, inc.

CAROLINAS AND VIRGINIA LOCATIONS

My clients are dynamic, aggressive, growing state-of-the-art companies looking for the "best" data processing professionals out there. One phone call to me could make you aware of an opportunity you wouldn't want to miss.

Systems Programmers
(MVS, DOS, VM, CICS)

Programmers and Analysts
(IMS, IDMS, CICS, MSA, ADABAS)
(VAX/DATATRIEVE)

Data Base Analyst/Administrator
(IDMS)

Hardware/Software Planning Manager
(IBM, HP, DEC)

DISSOS Administrator

LET'S TALK - CALL ASAP
BRENDA CAREY, CPC
(919) 584-5591
PERSONNEL PLACEMENT, INC.
P.O. BOX 1815
BURLINGTON, NC 27216-1815

HELP WANTED: Senior Software Engineer

PLEASE SEND RESUME TO:

EMPLOYMENT SECURITY DEPARTMENT
ES DIVISION, ATT: AEC # 45651
OLYMPIA, WASHINGTON 98504

JOB DESCRIPTION: Senior Software Engineer, Systems Language Group. Designs, implements, and tests complex and high level systems and software for mini and micro computers and processors. Assumes lead responsibility for design of Compiler system software for the 8086 family (Intel) and the 6800/68000 (Motorola) processors utilizing FORTRAN, Assembly and Pascal languages. Assumes major project responsibility including: 1) requirements and analysis of project specifications; 2) product design; and 3) implementation schedules.

REQUIREMENTS: M.A. OR M.S. IN COMPUTER SCIENCE, MATHEMATICS, ELECTRICAL ENGINEERING OR PHYSICS. COMPUTER SOFTWARE DESIGN OR PROGRAMMING: 6 MONTHS' EMPLOYMENT EXPERIENCE UTILIZING PASCAL, FORTRAN AND ASSEMBLY LANGUAGES AND UTILIZING 8086 (INTEL) AND 6800 OR 68000 (MOTOROLA) PROCESSORS. 20 COURSE HOURS IN COMPILER DESIGN INVOLVING FORMAL PARSING TECHNIQUES.

SALARY: $32,500 per annum.

POSITION OFFERS PREVAILING WORKING CONDITIONS, 40 HOUR PER WEEK, FULL FLEX TIME. BELLEVUE, WASHINGTION.

EOE

WE'LL MATCH YOUR SALARY. RAISE IT. AND, GIVE YOU TIME AND A HALF FOR OVERTIME.

CGA Computer, Inc. knows top-notch programmers and analysts are a sure bet to the success of our national contract consulting business. So we up the ante in salaries and benefits to get the qualified consultants we need to satisfy our consulting contracts.

If you have **HONEYWELL, SPERRY-UNIVAC, IBM, IDMS/ADSO, UNIX/C, NATURAL/ADABAS, CICS or DL/1** experience, give us a call.

• Paid vacations and holidays • Health and life insurance • Dental insurance • 401 (k) plan • Between project pay • Merit reviews • Technical challenge • Professional growth • Constant upgrading of skills • Excellent salaries • Superior benefits ...

Don't gamble with your career. Deal yourself a winning hand with CGA. Call us collect today at 414-784-9402. (SUBCONTRACTORS WELCOME)

cga Computer Inc.

205 Bishops Way, Suite 206, Brookfield, WI 53005
EQUAL OPPORTUNITY EMPLOYER M/F

SANTA FE
SYSTEMS SOFTWARE SPECIALISTS

SANTA FE, nestled against the *Sangre de Cristo* mountains, is one of the most attractive places to live. With a mild climate, this growing city of 50,000 is rich in history, culture, art, and outdoor recreational opportunities.

The New Mexico Information Systems Division is recruiting professional **SOFTWARE SPECIALISTS** to support its rapidly expanding multiple processors environment. Openings currently exist for **systems programming personnel** in the MVS, VM, and Teleprocessing areas.

The operating environment of the State of New Mexico's central computer installation includes two IBM processors running MVS and VM. Both SNA and non-SNA communications support CICS and VM/CMS.

APPLICANTS should have extensive knowledge of IBM software and assembler. MVS applicants must possess extensive knowledge of MVS, JES2, and TSO; VM applicants should have similar backgrounds in VM/CMS, preferably utilizing VCNA and VRNA; and teleprocessing applicants should possess extensive knowledge of SNA communications in MVS and VM environments.

Depending on the position and your qualifications, salaries range from **$24,000** to **$35,000**. A comprehensive benefit package is included, and a four-day workweek and flextime are also offered.

For **IMMEDIATE** and **CONFIDENTIAL** consideration, please submit your resume to:

JOHN BOYD, General Services Department, ISD
715 Alta Vista
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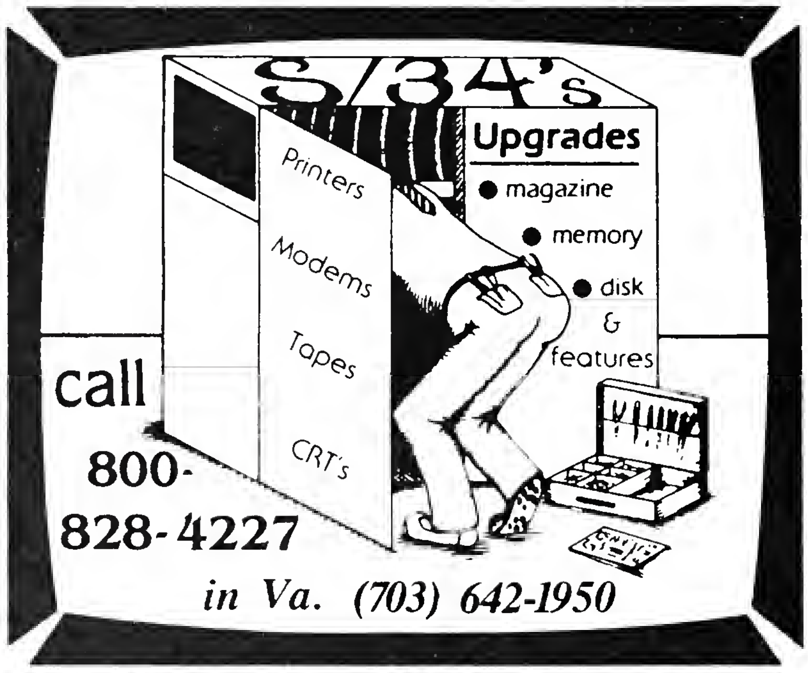

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Sealed Proposals for FC-2723-85, MAINTENANCE MANAGEMENT AND PLANNING SYSTEM DESIGN PROJECT, will be received by the Bureau of Purchasing and Real Estate, 2nd Floor, 197 Central Avenue S.W., Atlanta, Georgia 30335, before 2:00 p.m. EST, THURSDAY, DECEMBER 12, 1985. Proposals will be publicly opened and names of responding proponents will be read in Room 101, 1st Floor, 197 Central Avenue, S.W., Altanta, Georgia.

Proponents are asked to provide the City of Atlanta with a proposal for the implementation of a comprehensive and integrated maintenance planning and management system, including computer software and optional hardware which will provide capabilities for planning, budgeting, work assignment, work scheduling, reporting and database support.

Instructions for submitting proposals and specifications for this project may be obtained between the hours of 1:00 p.m. and 5:00 p.m. in Room #310, 3rd Floor, 197 Central Avenue, S.W., Atlanta, Georgia at no cost.

A Preproposal Conference will be held on MONDAY, DECEMBER 2, 1985, at 11:00 a.m. Room 101, 1st Floor, 197 Central Avenue, S.W., Atlanta, Georgia. Available for discussion at this meeting will be a representative from the Bureau of Purchasing and Real Estate, Office of Contract Compliance, Department of Water and Pollution Control and the Office of Management Systems.

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Cost: The price for each standard unit is $140.00 (One unit minimum and no fractional units allowed.) There are no agency commisions or quantity discounts.

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- The Bulletin Board is designed to advertise only one piece of equipment or software per unit.
- Units are one column wide by one inch deep at a cost of $160.00 per column inch. Although several units may be purchased for one advertisement, there will be no quantity discount.
- All ads are standard in format and typeface. No special typeface, borders or logos are allowed. Copy may be up to 25 words per unit.
- The Bulletin Board ads are listed by manufacturer or by product type under appropriate headlines.
- Ads are set on a six-column page in our classified section under "The Bulletin Board".

How to Place an Ad in the Bulletin Board:

- We suggest you prepare your ad before contacting us. Here are some guidelines:
  The first line is set in larger, bold type and should contain standard equipment identification.
  The body copy should describe the equipment and state the price.
  The closing should supply the seller's name and telephone number.
  This is all the information an interested buyer needs for follow up.
- Ads are accepted by mail, phone or by telecopier.
- Deadline is 7 days in advance of Monday issue.
- If you have never advertised with **Computerworld,** we request a check with your order.
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Here's the Address and Phone.

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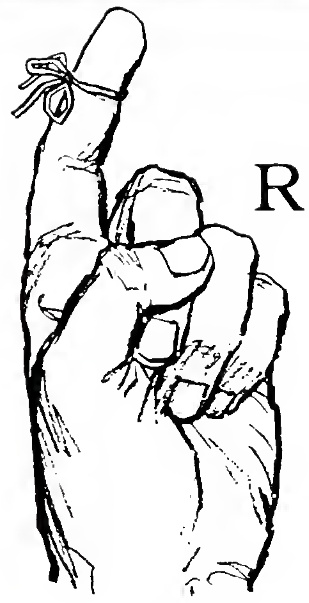

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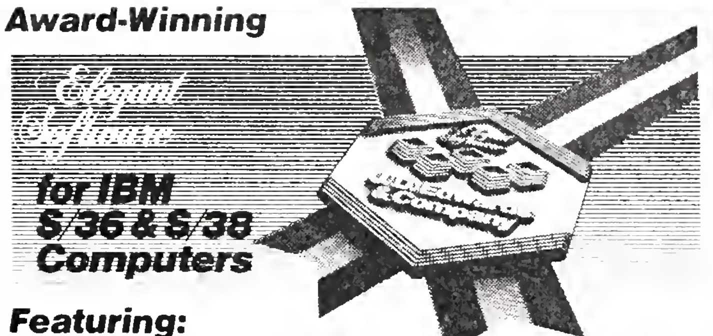
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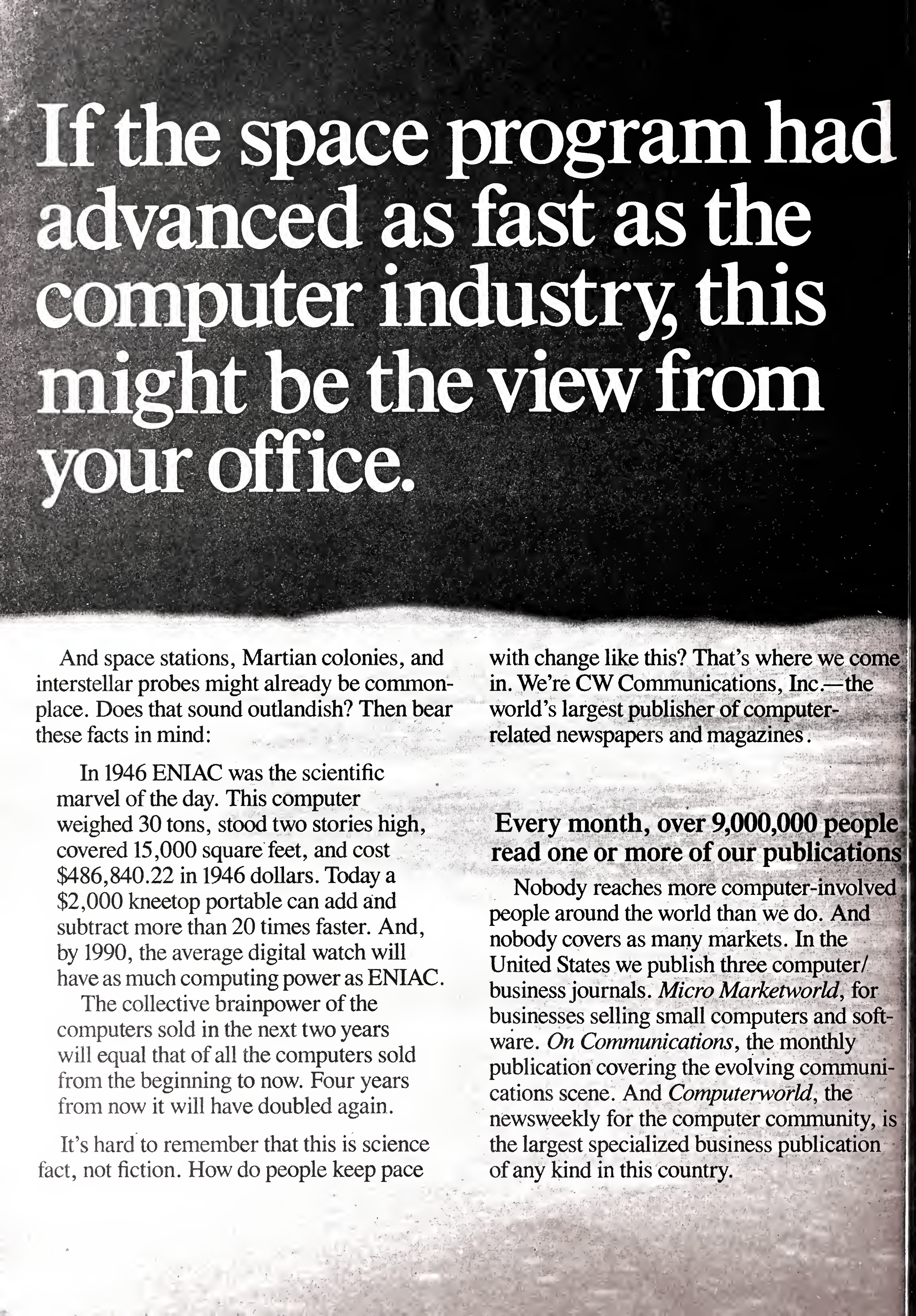

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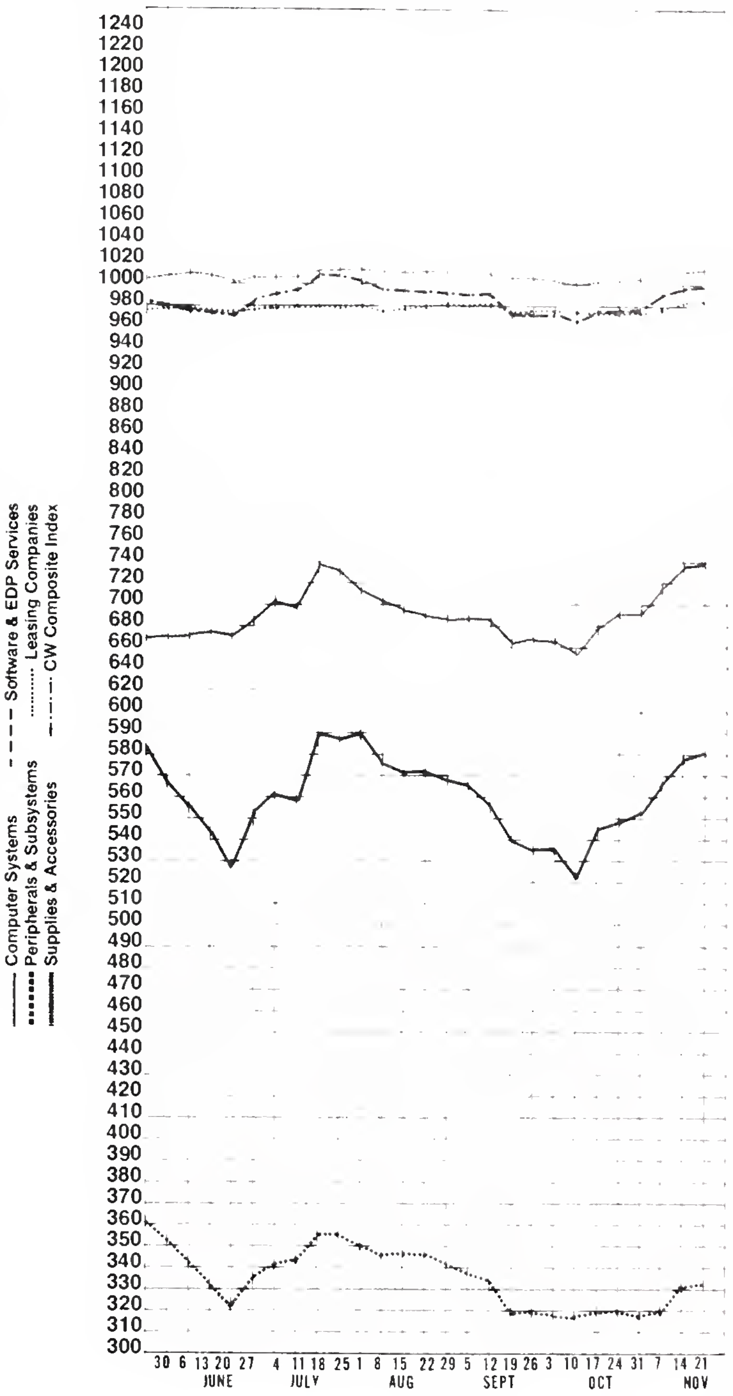

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O	ALTOS COMPUTER SYST	7- 14	11 5/8	+ 1/8	+1.0
A	AMDAHL CORP	10- 19	11 7/8	+ 7/8	+7.9
O	APPLE COMPUTER INC	14- 31	19	- 3/8	-1.9
O	APPOLLO COMPUTER	9- 31	11 1/2	- 1/4	-2.1
N	AT&T	18- 25	23	+1 3/8	+6.3
N	BURROUGHS CORP	51- 66	59 1/8	+ 7/8	+1.5
O	COMPAQ COMPUTER CP	4- 12	11 7/8	+1 3/8	+13.0
O	COMPUTER AUTOMATION	3- 9	3	-1 1/4	-29.4
A	COMPUTER CONSOLES	5- 20	6 7/8	+ 5/8	+10.0
N	CONTROL DATA CORP	16- 39	17 5/8	- 1/4	-1.3
O	CONVERGENT TECHNOL	5- 17	9 5/8	+1	+11.5
O	CPT CORP	5- 12	6 1/4	+ 5/8	+11.1
N	CRAY RESEARCH INC	23- 66	65 3/4	+3 7/8	+6.2
O	DAISY SYSTEMS CORP	21- 38	25 3/4	- 1/4	-0.9
N	DATA GENERAL CORP	31- 76	41 1/4	-2 7/8	-6.5
N	DATAPOINT CORP	5- 23	5 1/8	- 3/8	-6.8
N	DIGITAL EQUIPMENT	85-126	116 7/8	+ 1/4	+0.2
A	EECO INC	12- 16	15 3/4	+ 1/8	+0.7
N	ELECTRONIC ASSOC.	3- 6	4 3/4	0	0.0
N	FLOATING POINT SYST	15- 35	33 1/2	+ 1/2	+1.5
N	FOXBORO	24- 34	24 1/2	- 3/8	-1.5
N	GOULD INC	20- 34	33 1/4	+1 1/4	+3.9
N	HARRIS CORP	23- 35	25 7/8	- 1/4	-0.9
N	HEWLETT-PACKARD CO	30- 44	34 1/4	+1 1/2	+4.5
N	HONEYWELL INC	53- 67	66 1/4	+1 7/8	+2.9
N	IBM	116-139	138	+4	+2.9
O	IPL SYSTEMS INC	1- 4	1 1/8	- 3/8	-25.0
N	ITT CORP	24- 37	33 1/4	- 5/8	-1.8
N	M/A-COM INC	13- 24	13 1/4	+ 1/4	+1.9
N	MANAGEMENT ASSIST	2- 29	3 1/8	- 1/8	-3.8
N	MATSUSHITA ELEC(ADR)	49- 68	57 7/8	+2 1/4	+4.0
O	MENTOR GRAPHICS	13- 30	16 1/2	+ 3/8	+2.3
N	MODULAR COMPUTER SYS	6- 10	5 7/8	0	0.0
N	MOHAWK DATA SCI	2- 15	1 3/4	+ 1/8	+7.6
N	MOTOROLA INC	29- 44	34 7/8	+1 1/8	+3.3
N	NAT'L SEMICONDUCTOR	10- 17	12 1/8	+ 3/4	+6.5
N	NBI INC	11- 21	12 5/8	- 7/8	-6.4
N	NCR	23- 37	37	+ 3/8	+1.0
N	PERKIN-ELMER	22- 30	27 1/4	- 1/8	-0.4
N	PRIME COMPUTER INC	15- 20	19 7/8	+ 5/8	+3.2
N	SPERRY CORP	35- 59	48 5/8	+ 5/8	+1.2
O	STRATUS COMPUTER INC	8- 22	21 3/4	+ 3/4	+3.5
O	TANDEM COMPUTERS INC	14- 29	18 5/8	+ 1/8	+0.6
N	TANDY CORP	24- 38	38	+1 1/2	+4.1
O	TELEVIDEO SYSTEMS	2- 7	2 7/8	+ 1/8	+4.5
O	TELXON CORP	7- 19	18 1/4	-1	-5.1
N	TEXAS INSTRUMENTS	86-148	102 3/4	+7 3/8	+7.7
A	ULTIMATE CORP	8- 24	17 1/8	+2 5/8	+18.1
O	VECTOR GRAPHICS INC	0- 1	1/8	- 1/16	-24.8
A	WANG LABS "B"	15- 32	18 5/8	- 1/8	-0.6
A	WANG LABS "C"	15- 32	18 7/8	0	0.0
N	XEROX CORP	47- 56	55 3/4	- 1/8	-0.2

LEASING COMPANIES

EXCH		1985 RANGE (1)	CLOSE NOV 20 1985	WEEK NET CHNGE	WEEK PCT CHNGE
N	COMDISCO INC	8- 24	22 7/8	- 7/8	-3.6
N	CONTINENTAL INFO SYS	5- 14	14	+ 5/8	+4.6
O	FINALCO GROUP INC	3- 7	3 3/4	0	0.0
O	PHOENIX AMERICAN INC	2- 8	2 3/4	+ 1/4	+10.0
O	SELECTERM INC	7- 14	6 3/4	0	0.0
N	U.S. LEASING	32- 43	35 7/8	- 1/8	-0.3

COMPONENTS

EXCH		1985 RANGE (1)	CLOSE NOV 20 1985	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADVANCED MICRO DEV	23- 41	26 5/8	+1 5/8	+6.5
O	ADV'D SEMICONDUCTOR	8- 25	9 1/2	0	0.0
N	ANALOG DEVICES INC	16- 25	22 3/4	+1 1/4	+5.8
O	ANALOGIC CORP	9- 16	12 7/8	0	0.0
N	APPLIED MAGNETICS CP	8- 16	14 1/8	- 1/2	-3.4
O	HADCO CORP	3- 10	4 5/8	+ 1/2	+12.1
O	MICRO MASK INC	6- 14	5 7/8	0	0.0
N	TERADYNE	18- 35	22 1/2	+2	+9.7

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON;
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		1985 RANGE (1)	CLOSE NOV 20 1985	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	2- 4	4	+ 1/8	+3.2
N	ADVANCED SYSTEMS INC	9- 20	14 1/4	+1	+7.5
N	AGS COMPUTERS INC	10- 18	18 3/8	+ 1/2	+2.7
O	AMERICAN SOFTWARE	7- 15	10 3/4	+1 1/4	+13.1
N	ANACOMP INC	1- 4	2 3/4	+ 1/8	+4.7
O	ANALYSTS INTL CORP	5- 11	8 3/4	+ 1/4	+2.9
N	APPLIED DATA RES	17- 40	31 5/8	+10 3/8	+48.8
O	ASHTON TATE	8- 16	15 3/4	+1 3/4	+12.5
O	ASK COMPUTER SYSTEMS	8- 24	10 7/8	- 1/4	-2.2
B	ASTRADYNE COMP IND	1- 7	1 3/4	0	0.0
N	AUTOMATIC DATA PROC	35- 56	55 3/4	+ 1/8	+0.2
O	COMPUTER ASSOC INT'L	16- 30	27 1/2	+ 1/2	+1.8
O	COMPUTER HORIZONS	5- 13	13 7/8	- 3/8	-2.6
O	COMPUTER NETWORK	5- 10	6 1/8	- 5/8	-9.2
N	COMPUTER SCIENCES	12- 29	28	- 7/8	-3.0
O	COMPUTER TASK GROUP	10- 22	21 1/2	+ 1/4	+1.1
O	COMPUTER USAGE	1- 3	1 5/8	0	0.0
O	COMPUTONE SYSTEMS	4- 11	4 7/8	0	0.0
O	COMSERV CORP	1- 6	2 1/2	0	0.0
O	COMSHARE	6- 12	12 1/8	+1 5/8	+15.4
N	CULLINET SOFTWARE	14- 33	18 1/2	+1 1/4	+8.1
O	CYCARE SYSTEMS INC	18- 27	20	+ 1/4	+1.2
O	HOGAN SYSTEM INC	4- 15	6 3/4	- 1/4	-3.5
N	GENERAL ELECTRIC CO	53- 85	65 1/8	+1 3/4	+2.7
N	GENL MOTORS E (EDS)	17- 47	40 3/4	+ 3/8	+0.9
N	GTE CORP	38- 45	42 1/4	+ 3/8	+0.8
O	INFORMATION SCIENCE	1- 6	2	0	0.0
O	INFOTRON SYSTEMS CP	15- 35	18	0	0.0
O	KEANE ASSOCIATES	9- 19	14 1/4	+ 3/4	+5.5
N	LOGICON	24- 39	38 1/2	+ 1/2	+1.3
O	LOTUS DEVELOPMENT CP	16- 34	22	+3	+15.7
O	MCI COMMUNICATIONS	7- 11	10 1/4	- 3/8	-3.5
O	MNGT SCI AMER INC	8- 16	11 3/8	+1	+9.6
O	MATHEMATICAL APP GRP	2- 9	2	- 3/8	-15.7
O	MICOM SYSTEMS INC	14- 42	16 1/4	- 1/4	-1.5
O	MICROPRO INT'L CP	2- 4	2 3/8	+ 1/8	+5.5
O	NATIONAL DATA CORP	7- 16	16 3/8	+ 1/8	+0.7
O	ON-LINE SOFTWARE INT	4- 10	6 1/4	- 1/2	-7.4
O	PANSOPHIC SYSTEMS	11- 25	21 3/4	-2 5/8	-10.7
N	PLANNING RESEARCH	9- 19	18 1/4	- 3/8	-2.0
O	POLICY MGMT SYSTS CP	18- 35	20 1/2	+ 1/4	+1.2
O	PROGRAMMING & SYS	4- 7	7 1/4	+1 1/8	+18.3
O	REYNOLDS & REYNOLD	29- 45	45	+ 1/2	+1.1
O	SEI CORP	11- 23	22 1/2	+1 3/4	+8.4
O	SHARED MEDICAL SYST	24- 35	35 3/8	+1 7/8	+5.5
O	SCIENTIFIC COMPUTERS	5- 12	5 1/2	- 1/8	-2.2
O	SOFTWARE AG	11- 22	16 1/8	+1 1/2	+10.2
N	URS CORP	10- 14	11 1/4	0	0.0
N	UCCEL	9- 17	14 1/4	+ 3/8	+2.7
O	VM SOFTWARE	17- 24	18 1/2	+1 1/4	+7.2

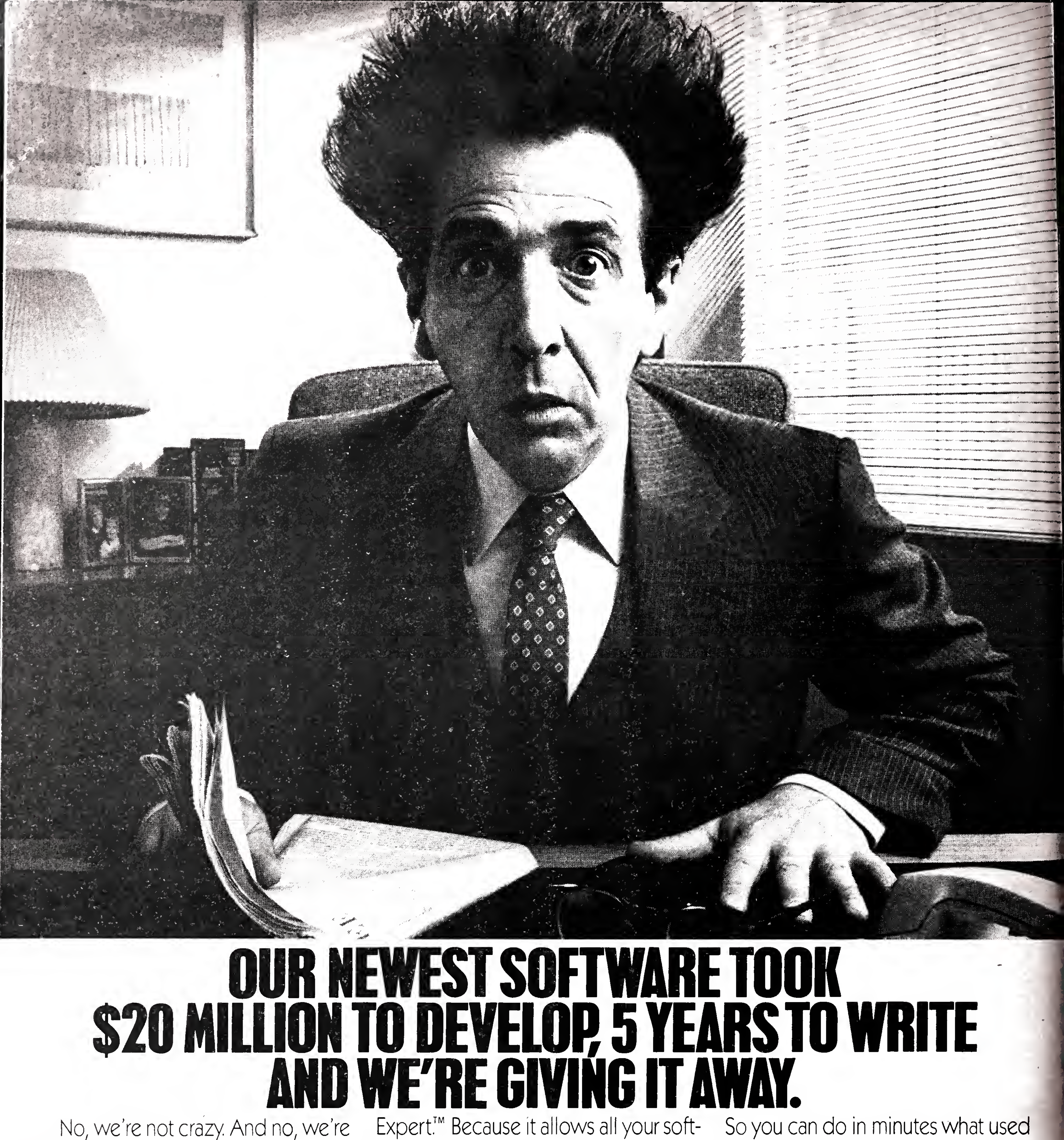
PERIPHERALS & SUBSYSTEMS

EXCH		1985 RANGE (1)	CLOSE NOV 20 1985	WEEK NET CHNGE	WEEK PCT CHNGE
P	AM INTERNATIONAL	3- 9	4 3/4	- 1/4	-5.0
A	ANDERSON JACOBSON	2- 11	2 3/4	0	0.0
O	AST RESEARCH INC	7- 24	23 5/8	+2 1/2	+11.8
O	AUTO-TROL TECHNOLOGY	4- 15	4 1/8	- 3/8	-8.3
O	AVANT-GARDE COMPUTNG	6- 26	6	0	0.0
O	BANCTEC INC	5- 12	8 7/8	- 1/4	-2.7
O	BEEHIVE INT'L	1- 2	1/8	0	0.0
N	BOLT,BERANEK & NEW	19- 32	30 3/4	+ 1/8	+0.4
O	CAMBEX CORP	1- 3	3/4	+ 1/8	+20.0
N	CENTRONICS DATA COMP	3- 12	4 3/4	0	0.0
A	CETEC CORP	6- 10	7 1/4	+ 1/2	+7.4
A	COGNITRONICS	4- 7	4	- 3/8	-8.5

EXCH		1985 RANGE (1)	CLOSE NOV 20 1985	WEEK NET CHNGE	WEEK PCT CHNGE
N	COMPUGRAPHIC CORP	24- 37	27 1/4	+1 1/4	+4.8
O	COMPUTER TRANSCEIVER	1- 4	5/8	0	0.0
N	COMPUTERVISION CORP	10- 46	11 1/8	+ 7/8	+8.5
N	CONRAC CORP	13- 16	14 7/8	+ 1/2	+3.4
A	DATAPRODUCTS CORP	11- 24	14	+ 1/8	+0.9
A	DATARAM CORP	3- 8	7 1/2	- 1/8	-1.6
O	DATA SWITCH CORP	4- 9	5 1/4	- 1/2	-8.6
O	DATUM INC	5- 9	5 3/8	0	0.0
O	DECISION DATA COMPUT	9- 19	11 1/2	+ 3/8	+3.3
O	ENDATA, INC	3- 25	3 1/8	+ 1/8	+4.1
O	EVANS & SUTHERLAND	6- 19	18 1/8	-1	-5.2
O	GANDALF TECHNOLOGIES	5- 20	7 1/4	+ 1/4	+3.5
N	GEN'L DATA COMM IND	8- 35	10 1/8	- 1/2	-4.7
N	HAZELTINE CORP	3- 28	23 5/8	+1 5/8	+7.3
O	ICOT CORP	6- 17	7 1/2	0	0.0
O	INFORMATION INTL INC	4- 15	12 1/8	0	0.0
O	INTECOM INC	4- 38	5 1/4	+ 1/8	+2.4
O	INTEL CORP	7- 28	28 1/4	+1 1/2	+5.6
A	LUNDY ELECTRONICS	4- 14	11 3/4	0	0.0
O	MEGADATA CORP	3- 13	3 1/2	+ 1/8	+3.7
A	MSI DATA CORP	8- 30	8 5/8	- 1/4	-2.8
N	NASHUA CORP	15- 28	27 1/2	+1 3/4	+6.7
O	NETWORK SYSTEMS CORP	20- 45	22 5/8	0	0.0
N	NO AMERICAN PHILIPS	30- 42	36 3/8	+ 5/8	+1.7
N	NORTHERN TELECOM LTD	1- 38	32 1/8	-1	-3.0
O	OMEX	1- 3	1/2	0	0.0
N	PARADYNE CORP	7- 14	7 1/2	+ 3/8	+5.2
A	PENRIL CORP	7- 29	7 5/8	+ 3/8	+5.1
N	PLESSEY CO (ADR)	9- 23	21 3/4	+ 1/4	+1.1
O	PRINTRONIX INC	8- 17	12 7/8	+ 1/8	+0.9
O	QMS INC	3- 11	9 3/8	+ 1/2	+5.6
O	RAMTEK CORP	3- 17	2 3/4	- 1/2	-15.3
N	RECOGNITION EQUIP	9- 51	11 5/8	+ 1/4	+2.1
N	SANDERS ASSOCIATES	11- 37	34 3/8	+3 1/8	+10.0
O	SCAN-TRON CORP	8- 17	16 1/4	+ 1/2	+3.1
N	SCIENTIFIC ATLANTA	4- 14	11 1/8	0	0.0
O	SEAGATE TECHNOLOGY	2- 12	6 1/8	+ 1/8	+2.0
N	STORAGE TECHNOLOGY	1- 3	1 3/4	0	0.0
O	SYKES DATATRONICS	0- 11	1/8	0	0.0
A	T BAR INC	5- 20	5 1/8	0	0.0
A	TAB PRODUCTS CO	4- 19	16 7/8	+ 1/8	+0.7
O	TANDON CORP	3- 13	3 1/4	- 3/8	-10.3
A	TEC INC	7- 68	7 1/2	- 1/8	-1.6
N	TEKTRONIX INC	30- 63	50 1/2	-2 7/8	-5.3
N	TELEX	1- 52	51 5/8	+2 1/4	+4.5
O	TESDATA SYSTEMS CP	1- 23	1 1/8	- 3/8	-25.0
N	TIMEPLEX INC	5- 22	20 1/4	- 1/8	-0.6
N	TITAN CORP	3- 9	7 3/4	+1	+14.6
O	VISUAL TECHNOLOGY	1- 10	5/8	- 1/8	-16.6

SUPPLIES & ACCESSORIES

EXCH		1985 RANGE (1)	CLOSE NOV 20 1985	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMERICAN BUS PRODS	21- 31	31 1/8	+1 1/8	+3.7
N	BARRY WRIGHT	17- 33	19 3/8	0	0.0
A	DUPLEX PRODUCTS INC	12- 20	17 7/8	- 1/2	-2.7
N	ENNIS BUS. FORMS	10- 20	19 7/8	+ 1/2	+2.5
N	3M COMPANY	74- 86	80 1/8	-1 1/8	-1.3
N	MOORE CORP LTD	13- 22	20 3/8	+ 3/8	+1.8
O	STANDARD REGISTER	18- 39	36 3/4	- 1/4	-0.6
N	WALLACE COMP SERVICE	28- 40	39	+ 3/4	+1.9



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